The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Overseas Trade

AFTER the excellent start made in January and February, the Board of Trade returns of chemical overseas trade for March are a little disappointing. There is a decline of £12,025 in imports, a continuation of the favourable tendency recently noted, but there is also a decline of £209,546 in exports. This so far outweighs the progress in the first two months, that for the first quarter of the present year there is a decrease in chemical exports of £188,047. Even so, however, the balance of chemical trade in favour of this country remains substantial. For the three months January, February, and March, our chemical exports amounted to £6,198,858, as compared with imports of the value of £3,644,951. Rather curiously, and without any obvious reason, re-exports of chemical products show an increase for March of £166,602, and an increase for the whole quarter of £163,351.

Going through the details, one notices some marked variations. On the import side there are substantial increases in acetic anhydride and acetic acid, borax, calcium carbide, potassium compounds, miscellaneous drugs and miscellaneous dyes. On the other hand, coal tar product imports have fallen from £51,230 to £2,489, sodium nitrate from £186,210 to £24,569, and sodium compounds from £32,736 to £19,164. Among the exports, sulphate of ammonia continues to advance, but coal tar products are down by £74,000, and there is a decline in several other sections. It is not easy to suggest any convincing reasons for the falling off, regrettable though it be, and one may only express the hope that the good tendencies of the earlier months will soon be restored.

The Budget

"THERE may be sound Socialist strategy in the Budget, but if that be so it is quite beyond my comprehension." These are the words of Mr. James Maxton in an interview with the *Daily Herald*, and they give the key to the Budget as a whole. The fact is that Mr. Snowden has done no more and no less than any Chancellor, in circumstances as they are to-day, would have found it necessary to do. Those who see some hope in the national financial position and think they know the way out of the present mass of difficulty will therefore find little to worry about in Mr. Snowden's speech on Monday. Those, on the other hand, who regard an annual public expenditure of £1,400,000,000 of rates and taxes as a slow and steady process of national suicide will be more despondent than ever at this, the twelfth, post-war Budget, which takes us further than ever from sane ideas of economy.

Such minor alterations in taxation as are actually made are, as might be expected, mostly in the wrong direction. Another £48,000,000 is to be extracted from estate duty, income tax, and surtax, while at the same time three-fourths of the bearers of these imposts are to be charged rather less than before. This is the easy road. It is straightforward vote-catching. The bulk of the unthinking mass will applaud. Students of industry know all too well that the extra money will come straight out of the fund on which prosperity and employment depend.

Mr. Snowden's clever bid for the support of the middle classes, his recognition of the growth of sentimental socialism among them, is perhaps the most serious feature of the Budget as a whole. There are far too many people under the delusion that they are free from personal responsibility for public expenditure. Now, as the *Daily Herald* most significantly points out on its front page, the man earning £700 a year, with two children, will actually pay less in 1931–32 than he pays to-day. The demand note which he has just satisfied was for £30 2s. Next January he will be asked for £27 18s. 6d. and, it is to be assumed, will accordingly bless the Socialist Government. All of which helps to hide the fact that the huge burden of local and national public expense, now amounting to £4 10s. per week per family, is in itself the chief cause of the price level in this country, which enhances the cost of everything we buy and make and ruins our position in the markets of the world.

The Budget wipes out the last remnants of the pretence at helping industry from the derating pro-

posals of a year ago. The sum of £30,000,000 has been added to the Whitehall account on the supposition that there is some corresponding relief of local rates. Ratepayers do not share the enthusiasm of politicians in this matter. There has been in some cases a welcome readjustment by derating. In most cases, however, the benefits have been more than balanced by new assessments. These new assessments were put upon us accompanied by the most specific of political pledges that they were for purposes of rating, and had no connection with Schedule A. Mr. Snowden now announces a new assessment for Schedule A which will, of course, be followed in a year or two by a corresponding levelling up of rating figures. Water companies here and there will profit by these devices, but in the end the rating burden will be heavier, notwithstanding the £30,000,000 addition to the national Budget.

All these charges go straight into the costs of manufacture. The motor industry and the trades that are subject to the operation of Safeguarding Acts are granted some respite from disturbance of the present arrangements. The building trade, however, just beginning to see signs of hope after years of political handicap, will despair at the thought that land taxes which, when first introduced by Mr. Lloyd George, began all the trouble and developed the housing shortage, are, notwithstanding their author's recantation and everybody else's protests, to be started up again.

Still, Mr. Snowden, so far as he has refrained from spectacular schemes and the temptation to satisfy his own back-benchers, has justified to the full the widespread confidence in him as a financier. Our position as a trading nation is probably safer in his hands than in those of any of the practical alternatives which present themselves. The pity is that he will be subject to no criticism that sound economists will be able to regard as effective or useful. He has to meet the onslaughts, such as they are, of the inventor and author of most of our present expenditure, Mr. Lloyd George, and (from the Opposition proper) of Mr. Winston Churchill, who, as a Conservative Chancellor, actually added to the expenses of the nation.

The Chemical Point of View

APART from its general aspects, which are discussed above, the Budget is of interest to chemical industry mainly for its non-interference with existing duties and arrangements. The McKenna Duties, which are to be allowed to run on, do not affect the industry. The Safeguarding of Industries Act, which in the normal course will remain in operation until August, 1936, and which does materially affect the industry, is also to continue. Part II, which deals with the prevention of dumping, is not so important from the chemical point of view, but Part I, which provides for the levying of Customs on imported synthetic organic chemicals, analytical reagents, and all other fine chemicals and chemicals manufactured for fermentation purposes, touches very directly the British fine chemical industry. The home manufacturers will, of course, be gratified to know that there will be no interference with the duties levied on the long list of imported chemicals that appear in the Board of Trade's schedule to Part I; while the importers will see their hope deferred of the time when dutiable chemical products may once more come in tax free. Both manufacturers and distributors will be thankful that their petrol will not be dearer. Of the Dyestuffs (Import Regulation) Act of 1920, the Chancellor said nothing; his speech contained no hint of what the Government intend to do when the Act runs out at the end of the year. It may reasonably be inferred that no final decision has yet been made, and that none will be made until we are in possession of the report which is now in preparation. From the standpoint of the chemical industry, the Budget leaves things as they were, and for another twelve months at least manufacturers and distributors will know the conditions under which they will have to operate.

Books Received

THE LIFE-FORCE IN THE INORGANIC WORLD. By Eleanor Hughes-Gibb. London: George Routledge and Sons, Ltd. Pp. 168. 5s.

MODERN STEELWORK. Edited by W. R. Gilbert. London: The British Steelwork Association. Pp. 256.

The Calendar

Apl. 25 & 26	Faraday Society. General Discussion on "Optical Rotatory Power." Annual General Meeting.	Burlington House, Piccadilly, London.
28	Oil and Colour Chemists' Association. Annual Dinner. 7 p.m.	Connaught Rooms, London.
May 1	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
1 & 2	Iron and Steel Institute: Annual meeting.	House of the Institution of Civil Engineers, Great George Street, London.
2	Faraday Society. "On Coagulation." Professor Dr. Georg Wiegner. 8 p.m.	Burlington House, Piccadilly, London.
5	Society of Chemical Industry (London Section): "Observations on the Condensations between Formaldehyde and Aromatic Compounds." Professor G. T. Morgan. 8 p.m.	Burlington House, Piccadilly, London.
7	Society of Public Analysts. 8 p.m.	Burlington House, Piccadilly, London.
7	Institute of Metals. Annual May Lecture. "The Influence of Technique on Research." Major F. A. Freeth. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.
8	Chemical Society, Faraday Lecture: "Chemistry and the Quantum Theory." Professor Dr. Niels Bohr. 5.30 p.m.	Salters' Hall, St. Swithin's Lane, London.
8	Oil and Colour Chemists' Association. Annual General Meeting. "Some Technical Methods of Preparing Wood Oil for Use in Paints and Varnishes. A. W. C. Harrison. 7.30 p.m.	30, Russell Square, London.
9	Chemical Engineering Group. Annual General Meeting and Dinner: "The Effect of Filter Aids on Industrial Development." Howard A. Young.	London.
13	Institution of Petroleum Technologists. 5.30 p.m.	John Street, Adelphi, London.
14	Society of Chemical Industry (Newcastle Section): "Cenospheres and the Structure of Coke." Dr. F. S. Sinnatt.	Armstrong College, Newcastle-on-Tyne.
15	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
16	Institute of Chemistry (Belfast Section): Annual General Meeting.	Royal Belfast Academical Institution.
23-24	Institute of Chemistry and Society of Chemical Industry (Edinburgh Sections): "Chemistry in Naval Warfare." Professor Kendall.	Edinburgh.

Patent Law and the Dyer

Effects of a Recent Judgment

At a meeting of the Manchester Section of the Society of Dyers and Colourists held on Friday, April 11, Mr. C. Hollins, B.Sc., A.I.C., read a paper on "Patent Law and the Dyer." Mr. G. E. Holden presided.

Mr. Hollins said that if a patent was granted to a foreigner who introduced a new manner of manufacture into this country, this was perfectly fair, but if the foreigner used his patent as a means of forcing the sales of some product or products made abroad and not patented in England, that was an abuse of the patent law and would discourage existing British manufacturers. This point had been carefully considered by the Patents Committee of the Association of British Chemical Manufacturers, which was set up to consider what amendments were desirable in the Patents Acts, and which had since presented its report to the Board of Trade Committee which was formed to receive such suggestions.

The Committee suggested that any objection in this respect would be overcome by adding a paragraph to section 27, subsection (2) of the Patents and Designs Acts, so that the section would then read "(2) The monopoly rights under a patent shall be deemed to have been abused in any of the following circumstances:—(*f*) If a patentee of a process covering the use of materials (whether or not they be the subject of a patent) permits the use of the invention under such conditions as to hinder or prejudice the existing manufacture of the said materials in the United Kingdom." They also suggested a further amendment in the powers given to the Comptroller to remedy the abuse of the monopoly rights in the form of a new sub-section immediately following subsection 3 (*b*) of the Acts in the following manner:—"He may order the suspension of the patent in favour of the applicant, or of the customers of the applicant, on such terms as the Comptroller may think expedient."

How Selection Patents Work

Mr. Hollins, in referring to the recent Naphthol AS case, said that there was no need for him to go over the history of the Azoic colours. In 1912–1913 the Griesheim Elektron Co. patented the use of hydroxynaphthoic arylamides in place of B-naphthol for the production of ice colours, the special advantage being that these arylamides had such affinity for cotton that it was unnecessary to dry the cotton after padding before coupling with the diazo components. That was a very meritorious invention, and for 16 years the Griesheim Elektron Co. and their successors, the I.G., held an unchallenged monopoly. The patents lapsed in March, 1928, but before that event there had appeared, from 1922 onwards, a long series of 30 to 40 patents in which specific groups of naphthols, bases, or naphthols and bases, were selected as leading to special valuable results. The position then, after March, 1928, was that anyone could manufacture naphthols, anyone could manufacture bases, and anyone could combine on the fibre certain bases with certain naphthols, but in certain combinations of naphthols and bases the I.G. retained a monopoly. The result was easily seen. Naphthol AS was free, Naphthol AS/SW, on the other hand, was free in certain combinations and not in others. Naphthol AS/TR could not be coupled with any diazo component except under licence. Of the diazo components Fast Red R could be coupled freely with Naphthol AS and AS/SW, but not with AS/D or AS/TR or AS/OL. Fast Red KB could be coupled with AS but not with AS/SW nor with AS/D, AS/TR, and so on. Unless the dyer kept two stocks of each of these bases (and, of course, the same applied to the naphthols), one of which was unrestricted in use, whereas the other could only be used for free couplings, he would be constantly risking an infringement action. The I.G. profited in that they sold the components of the selected couplings, and they also benefited in an indirect manner in that the dyer, refusing to keep two stocks of each of his components, bought all his naphthols and bases from the I.G.

They were all aware, of course, of the result of the action instituted by Imperial Chemical Industries in respect of the first three of the 30 to 40 selection patents. The judgment of Mr. Justice Maugham was subject to appeal, and, Mr. Hollins stated, he was, therefore, not free to comment upon it as possibly he might be when the time for appeal expired at the end of the present month. The three patents chosen for revocation happened to be the first three in order of date, and they also happened to include the only four selected naphthols which had so far appeared on the market, namely, Naphthol AS/D, AS/TR, AS/OL, AS/BG. He ought, of course, to make a correction in regard to AS/BG because it was disowned by the I.G. in the course of the action, and Mr. Justice Maugham held that it did not come within patent No. 193,834. This was a remarkable decision, but not more remarkable than the patenting of this little orphan by its putative parents. The cresidide which did not appear on the market was also thrown overboard by the I.G., but they had to receive it back into the fold.

Judge's Decisions on Selection Patents

The action for revocation was complicated by the filing of a motion to amend the patents, and it seemed at one time that the Judge might adopt the method of refusing amendments and declare the unamended patents invalid on admitted lack of merit, without giving the ruling that both sides desired, as to what constituted invention by selection. The judgment contained decisions on the conditions for valid selection patents, the admissibility of amendments and the kier-boiling merit (or absence of merit) of the actual selected couplings. So far as selection patents were concerned, the verdict amounted to this—that there was subject matter in an invention which selected, from amongst the substances disclosed in general terms in a prior document, a substance or group of substances not specifically mentioned therein, substantially all of which exhibited valuable qualities of a special character peculiar to the selected substances, such qualities being adequately defined. It appeared also that the claims must be limited to processes and products in which the valuable qualities were utilised.

The amendments were disallowed because they would have made the selection a different selection, and therefore the invention a different invention. As for the merit, the Judge found, on the evidence, that the selected couplings showed the same variations in the fastness to kier-boiling amongst themselves as did the unselected couplings. That is, that there was no merit in the selection.

Mr. Hollins added that the question of the merit of such dyes might perhaps be of more interest to the society than the legal questions involved in the conditions for validity of selection patents, but the defeat of any attempt to introduce into British law a new and, as some contended, unsound base for patenting was of real interest to all industrial chemists.

Patent Law Reform

To the Editor of The Chemical Age.

Sir,—I have read with great interest the remarks in your issue dated April 5, with reference to Patent Law reform, particularly respecting the Joint Chemical Committee's suggestions concerning medical patents.

You state, "The fact that the memorandum is the result of concerted action on the part of all the bodies representing the chemical industry," and further, on page 323, "the conclusions of the committee are endorsed by," and then follows a list of a number of societies.

It would probably be inferred from these remarks that the individual members of the various societies have had opportunity afforded them for expressing their views concerning the recommendations made in that report. Actually, it would be more correct to state that it had received the approval of the committees or councils of these various societies and that the evidence was offered to the Board of Trade prior to this memorandum even being available for inspection by the individual members of the various societies or associations.

I would venture the suggestion that whether the proposals with respect to medical patents will receive the unanimous support of the members is a matter of considerable doubt and such of your readers as are interested might well consult the most interesting lecture given by Dr. F. L. Pyman to the Manchester section of the Society of Chemical Industry, which is reported in the *Journal* of the Society, Vol 49, No. 12, dated March 21, 1930.—Yours, etc.,

H. Jephcott.

Chemistry and Chemotherapy of Iodine and Its Derivatives

By G. Malcolm Dyson, Ph.D., A.I.C.

The chemotherapeutic properties of iodine have lately been attracting a large and increasing amount of interest, and are the subject of much research. In general, the element is probably more in the public eye now than ever before, and its future applications are likely to be of very great importance.

It is only a little over a hundred years ago that iodine was added to the list of known elements. In 1811, M. Courtois, a saltpetre manufacturer of Paris, was experimenting with the mother liquors obtained by the recrystallisation of certain salts and obtained a substance with a beautiful violet vapour. He christened this substance "iodine" (from "iodos," "violet coloured"), and gave a sample to M. Clement, who investigated its properties, and in 1813 announced its existence to the Institute of Paris. The substance was enthusiastically investigated by Gay-Lussac and by Davy, who was at the time in Paris. Since then, iodine has not only become an indispensable chemical reagent, but its compounds have achieved a position of fundamental importance in chemotherapy.

Occurrence

It is seldom that iodine occurs free in nature, although minute traces are found in certain mineral waters, notably those of Bath, Cheltenham, Harrogate and Woodhall in this country, and those of Heilbronn, Vichy, Carlsbad and Marienbad on the Continent. The general distribution of iodine in nature offers an interesting problem to the mineralogist, since it has been shown that the occurrence of iodine is almost universal throughout mineral, animal and vegetable matter.

Thus, in 1850, the French pharmacologist A. Chatin showed experimentally that iodine was universally distributed throughout the organic kingdom, and half-a-century later Gautier first established the fact that iodine occurs in a large number of igneous rocks. His work was disputed at the time, and a committee appointed by the French Academie des Sciences was only able partially to confirm his work. Since that time (1900) his conclusions have been amply confirmed by the Swiss investigator von Fellenberg, and by Gulbrand Lunde. According to Goldschmidt's theory, the cooling earth segregated into three distinct solid phases—the nucleus which is assumed to be metallic and to consist of iron to a large extent; the mineral or sulphide layer in which the bulk of the metallic substances are present in the form of their sulphides; and the outer or siliceous layer.

Geological Distribution

It is interesting to examine the distribution of iodine between these layers. It is found in all of them, but appears not to be associated with any one particular species of mineral or rock. Thus, Lunde examined a large number of halogen-containing minerals, but found that the amounts of iodine present did not differ markedly from one type to another, although the actual figures obtained could be construed to indicate a slight chalcophile tendency. Meteorites also were shown to contain iodine, and micas had a slightly higher iodine content (0·7 mg./kg.) than most other rocks. A few of the typical results obtained in the estimation of iodine in various natural substances are given below:—

	Substance.	Iodine (mg./kg.)
Rocks:	Granite (Frederickshald)	0·20
	Obsidian (Island)	0·32
	Basalt (Daltenberg)	0·31
Minerals:	Marble (Carrara)	0·55
	Marble (Velfjiord)	0·07
	Hypersthene (Soggendal)	0·90
	Apatite (Bamle)	0·37

Apparently, all igneous rocks contain iodine to about the same extent, namely, 0·2–0·4 mg./kg., whilst the minerals contain a little more, up to 0·7 mg./kg. It is interesting to note that sedimentary rocks also contain iodine, and that coal is particularly rich in it, as might be expected from its vegetable origin. It occurred to Lunde that it would be of interest to trace the fate of iodine in coal. Surprising as it may seem, the coke from coke-ovens is abnormally rich (from the mineralogical standpoint) in iodine, and during the utilisation of metallurgical coke a portion of this iodine passes into the pig iron, in which it may be found to the extent of 0·2–0·7 mg./kg. In the conversion of the pig iron to steel, practically none of this iodine is lost, and in an exceptional German steel as much as 1·1 mg./kg. of iodine was found, while in the purest Swedish iron 0·2 mg./kg. was present.

Thus it is established that during the extraction of iron only a relatively small proportion of the iodine present in the raw materials passes into the finished metal; the slag from the blast furnaces contains about twice as much iodine as the finished iron, but the bulk of the iodine is concentrated in the flue dust. This ubiquity in the distribution of iodine is interesting when we consider the relation which exists between the iodine supply and the thyroid efficiency of animals, a matter which is discussed in detail later.

Iodine Minerals

Certain minerals are found to contain iodine in combination, but these, with the exception of the Chilean iodine minerals, are to be considered in the light of mineralogical curiosities. The principal minerals of this type are given below:—

Name.	Chemical Nature.	Formula.
Iodargyrite	Silver iodide	AgI
Marshite	Cuprous iodide	CuI
Miersite	(Mixed crystal)	$4AgICuI$
Iodembolite	(Mixed crystal)	$Ag(Br,I)$
Lauterite	Calcium iodate	$Ca(IO_3)_2$
Dietzite	Calcium iodate-chromate	$7Ca(IO_3)_2{\cdot}8CaCrO_4$
Coccinite	Mercuric iodide	HgI_2
Tocornalite	Double iodide of mercury and silver	$(Ag_2Hg)I_2$
Iodobromite	Silver chloro-bromo-iodide	$Ag(Cl,Br,I)$

In addition to the minerals mentioned in the table above, various common minerals contain, in certain limited localities, an abnormal amount of iodine. Examples are the Silesian zinc ores, the calcium phosphate of Quercy, in France, and the Montpelier limestone of the same country. Additional potential supplies of iodine exist in the petroleum brines of Russia and Rumania, and the iodiferous waters of Java, from which a certain amount of iodine is extracted at the present time.

Presence in Sea Water

The existence of iodine in sea water has been recognised for a considerable time, but the amount present is almost too small for accurate estimation. The concentration of the iodide ion is about 0·02 mg. per litre; however, the amount of sea water available is so large that the ocean offers an almost inexhaustible supply of iodine, even though the actual concentration is so small. The amount of iodine present in the sea has been computed at sixty billion tons. With regard to the distribution of iodine in the sea little is known, but it has been clearly shown that various marine organisms have the ability to concentrate iodine in their tissues. This matter will be discussed later in regard to seaweed, but it is not so generally known that fish also concentrate iodine. Thus, the following figures illustrate the amounts of iodine present in various parts of three of the most common fish:—

Fish.	Iodine (mg./kg., moist)	Iodine (mg./kg., dry intestinal canal).
Haddock	6·23	42·3
Mackerel	0·45	1·4
Herring	0·26	2·24

It has been shown that the fish in which abnormally high concentrations of iodine occur are those which feed on ground fauna, and an examination of the plankton has shown that these minute organisms contain as much as 231 mg./kg. of iodine. The diagram (Fig. 1) shows the general cycle of iodine in nature. It appears that a certain amount of the iodine found in plants is obtained by absorption from the atmosphere, and that when the plant dies and its tissues

decay, part of this iodine is returned to the atmosphere in the form of elementary iodine.

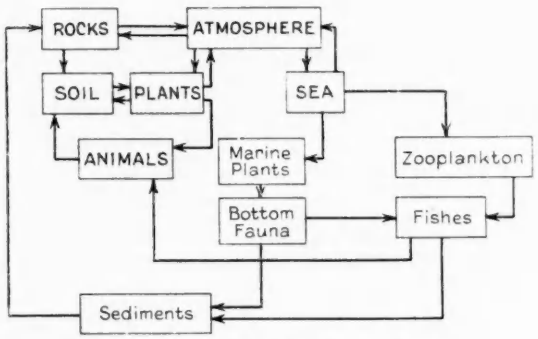


FIG. 1. IODINE CYCLE IN NATURE.

Commercial Sources

There are two commercial sources of iodine (excluding the iodiferous waters of Java)—the sea, and the nitrate deposits of Chile and elsewhere, in which a small amount of iodates is found. In the case of sea water itself, the extremely small concentration makes a direct extraction of the iodine impossible. Fortunately, certain sea weeds have the ability to concentrate within their cell structure the traces of iodine which occur in sea water, and the ash left after the burning of such weeds is comparatively rich in iodine.

It was recognised early that " kelp " (as the ash is termed) is an excellent source of iodine, and an old textbook (published only seven years after the discovery of the element) gives a recipe for its extraction therefrom. It also states that the method was invented by Wollaston, and that for purposes of iodine extraction French kelp is preferable to that prepared in this country, remarking however " that the waste soaper's lye in Glasgow abounds in it. And my friend Mr. Macintosh has separated iodine from it to a very considerable amount.'

Kelp

The burning of sea weed for kelp was practised in Europe for many years before the discovery of iodine, and in Great Britain commenced about 1720. In 1748, Mitchell described kelp as a hard stone-like mass obtained by the repeated combustion of the dried weed in a stone kiln. The kelp-burning industry grew in Great Britain until the early part of the nineteenth century, when the preparation of soda from rock salt began to be practised, and the demand for alkali from kelp diminished. In 1840 the demand for iodine led to a revival in kelp burning, but in 1873 when iodine began to be recovered from the Chilean nitrate liquors the industry again declined. A temporary revival took place during the Great War. At the present time, kelp is burned to a small extent in Scotland, Norway and Normandy, but the Chilean nitrate industry produces more than three times as much iodine as the rest of the world put together. Thus, in 1925, Chile produced 983 tons of iodine, compared to the 25 tons produced in the United Kingdom, 53 tons in France, 5 tons in Norway, 60 tons in Japan and 37 tons in Java.

The economic success of kelp utilisation depends on three factors :—the price of " mineral " iodine, the amount of iodine in the weed gathered, and the cost of its extraction. These three factors may vary considerably. At the present time the price of iodine is controlled by the Association of Iodine Producers in Chile, who work as an international combine with the Scotch and French producers. The industry is worked therefore on the lines of a monopoly, and the price is maintained fairly steadily at 1s. per ounce. The industry in Chile is regulated on the " quota " system, the quota which is allowed to be produced by each nitrate plant being determined by its nitrate capacity. There is, therefore, practically no prospect of a drop in the price of iodine during the next decade unless an abnormally large demand for the element arises.

The amount of iodine in sea weed is subject to both regional, seasonal and specific variations. Thus, among the varieties of weed burnt on the Scottish coast the following variations in the iodine contents have been noticed :

Name.	Iodine. (Per cent. in dry weed).
Laminaria digitata (stem)	0·454
Laminaria digitata (frond)	0·295
Laminaria stenophylla	0·34
Laminaria saccharina	0·279
Fucus serratus	0·086
Fucus nodosus	0·057
Fucus vesiculosus	0·030

It is obvious that the *Laminaria* are to be preferred to the *Fucusa*, since the iodine content is much higher. It corresponds to about 50 lb. of iodine per ton of dried weed, but this figure is very seldom, if ever, reached in actual extraction.

The seasonal variation in the iodine content of sea weed is important, since harvesting the weed at the right period may appreciably influence the yield of iodine. The graph below (Fig. 2) indicates the nature of the seasonal changes in a weed, and shows that to obtain the best results, it should be harvested in September. The question of the cost of extraction is one which has been debated, it being held by many that the present price of iodine does not allow the iodine to be recovered economically from the weed.

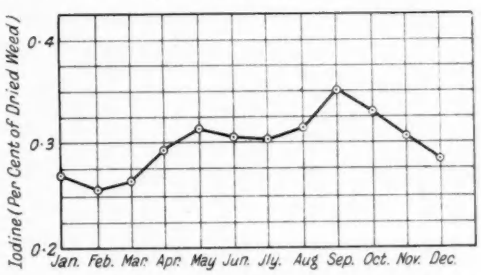


FIG. 2. VARIATION IN IODINE CONTENT OF LAMINARIA DIGITATA.

The older processes of kelp production were crude in the extreme. The weed or " wrack " was gathered, and allowed to dry in the sun for two days, during which time sufficient moisture disappeared to bring the raw material into a combustible condition. The weed must not on any account be allowed to stand in the rain previous to drying, since fresh water will extract the iodine from the weed, with a consequent decrease in the yield of iodine. In many places, especially the Scots districts, the weed is just burned in heaps and the ashes collected ; in others, some attempt is made to convert the ash into an easily handled form by incineration in low rock kilns. The bundles of weed are burnt in these kilns over a small fire, and a fresh lot of weed is added as soon as the previous one has been completely consumed. Each day's working gives a " floor of ashes " about three inches thick, and in a week some twenty or thirty inches of ash are accumulated. After the last burning, a little water is thrown into the kiln, which serves to break up the ash into lumps of a convenient size, which may then be easily removed and sent to a central refinery. An average analysis of such a kelp gives the following figures :—

ANALYSIS OF KELP.

Mineral matter (water-soluble) ..	61·12 per cent.
Mineral matter (Insol. in water ; sol. HCl)	27·71 ,, ,,
Siliceous residue	11·1 ,, ,,
Iodine	14 lb. per ton
Total halogen (Calc. as chlorine) ..	24·72 per cent.
Potash (K_2O)	13·48 ,, ,,
Soda (Na_2O)	11·46 ,, ,,
Sulphur trioxide	9·82 ,, ,,
Sulphur as sulphide	1·01 ,, ,,

Improvements in Treatment of Kelp

The question of the improvement of the process for incineration of the dried weed was raised as far back as 1870 by Stanford. He suggested that the dried weed be distilled from retorts in the same way as coal in the gas industry, and was able to show experimentally that such a process was advantageous. The advantages lie in the fact that more iodine is recovered, together with a larger yield of potash ; no sulphide is produced as in kelp burning, while the by-

product ammonia, gas and tar tend to reduce the cost of the process. The disadvantages lie in the necessity for hauling the weed to a central station for treatment, and for skilled labour to operate the plant. Stanford compared the three processes for sea weed utilisation and obtained the figures shown below:

	Process.		
	Kelp.	Retorting.	Wet Extraction.
	Per ton of air dried weed.		
Ash ..	3·6 cwt.	—	—
Charcoal ..	Nil	7·2–8 cwt.	Nil
Salts ..	1·8 cwt.	3 cwt.	4·2 cwt.
Iodine ..	3 lb.	7–8 lb.	6–8 lb.

The whole question of the carbonisation of sea weed has been very thoroughly investigated by the British Fuel Research Board. The weed used for their experimental plant was a mixed *Laminaria* obtained from the Irish coast. It was cut into 6–8 in. lengths, air-dried, and carbonised at 600° C. in a small iron horizontal retort holding 40 lb. of weed (moisture 7·8 per cent.) per charge. The gas which comes off at the beginning is almost all carbon dioxide, but after about thirty minutes the gas begins to be combustible, and at this point was passed into a holder.

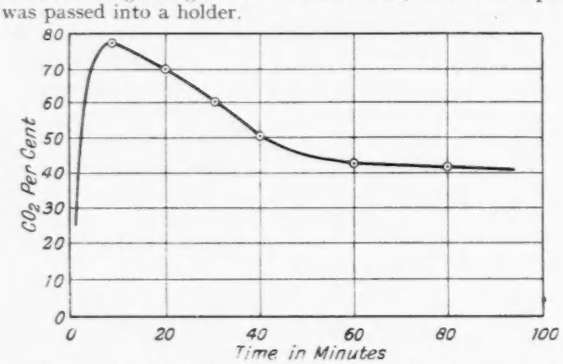


FIG. 3. GAS FROM CARBONISATION OF THE SEAWEED.

In Fig. 3 is shown the variation in the amount of carbon dioxide present in the gas. The evolution of gas ceased after about 90 minutes. The general products of such a carbonisation are given in the following table, the amounts being referred to one ton of air dried weed:—

Solid residue	8 cwt.
Tar (Density 1·048)	17·7 gallons.
Liquor (Density 1·037)	59·8 lbs.
Gas (Total)	5,400 cub. ft.
Gas (Combustible)	1,582 cub. ft.
Ammonium sulphate	33·6 lbs.

The important question which arises in connection with the retorting of weed is whether it can be made thermally self-sufficient. The combustible gas analysed thus:—

Carbon dioxide	38·5 per cent.
Hydrocarbons C_nH_{2n}	5·3 ,, ,,
Oxygen	0·4 ,, ,,
Carbon monoxide	10·6 ,, ,,
Hydrogen	13·0 ,, ,,
Hydrocarbons C_nH_{2n+2}	27·5 ,, ,,
Nitrogen	4·7 ,, ,,

Calorific Value of Gas

Such gas has a gross calorific value of 557 B.T.U. In order to arrive at an answer to the thermal question, the Board experimented with a bench of retorts (ten in number) each of 15 cub. ft. capacity and capable of dealing with 5 tons of air-dried weed in 24 hours. The weed contained 15 per cent. of water. From such a plant, gas was obtained equivalent to 65 therms, charcoal equivalent to 232 therms, and tar equivalent to 118 therms. It was calculated that the process should be thermally self-sufficient on the strength of the gas alone, but that with the utilisation of a part of the charcoal in a producer there would be an ample thermal margin.

In France the kelp ("varec") is obtained by the crude methods which are current in Scotland, but the Japanese, who even at the present time extract iodine from seaweed, observe great care in the burning of the weed. The harvesting is systematically controlled by the commercial interests, and the weed burned in suitably regulated kilns. The weeds are, of course, quite different from those found round European shores, and include *Ecklonia Cava, E. Bicyclis, Sargassum, Laminaria Japonica and L. Ochotensis*, the latter being particularly rich in iodine, its ash having been known to contain as much as 1 per cent. of iodine.

Utilisation of Kelp

Differences exist between the Scottish and French methods for the extraction of the valuable products from kelp. In the Scottish process (which is illustrated in Fig. 4) the ash is lixiviated in a manner very similar to that used in the extraction of black ash, and the filtered liquor evaporated, during which process a rough or "kelp" salt separates, which contains about equal proportions of sodium sulphate and potassium chloride. By solution in water, followed by alternate evaporations and cooling, the potassium chloride may be removed. The tail liquor from this operation is heated with manganese dioxide and strong sulphuric acid, and the iodine purified by sublimation. A certain amount of bromine is obtained during the early part of the distillation.

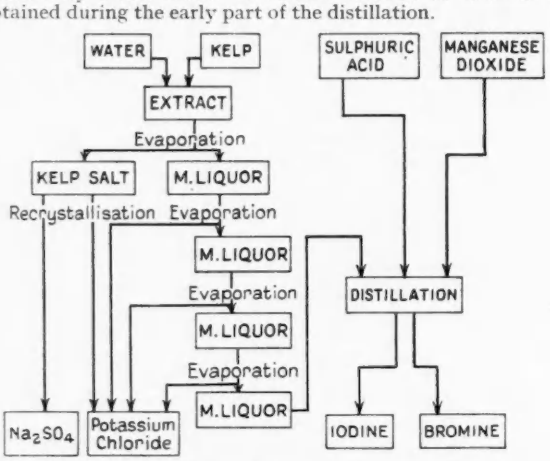


FIG. 4. SCOTTISH EXTRACTION OF IODINE FROM KELP.

In the French process, the iodine is removed by an ingenious process early in the extraction. The filtered extract is made acid to decompose the sulphide present, and again filtered. The iodine is precipitated from the clear liquid by means of copper sulphate, and the precipitated cuprous iodide removed by sedimentation. The flow sheet for the French process is given in Fig. 5:—

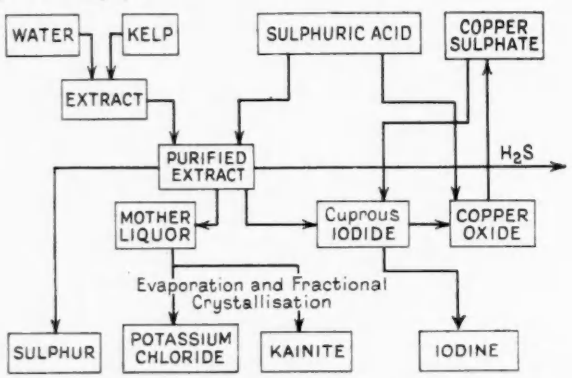


FIG. 5. FLOW SHEET OF THE FRENCH PROCESS

(To be continued.)

Carbon Dioxide Refrigeration Patent

SALE of solid carbon dioxide for use in refrigeration in a manner covered by the patent (U.S. 1,595,426) controlled by the Dry Ice Corp. of America is held to be a contributory infringement of the patent. An injunction prohibiting such sale has been ordered against the Carbide Corp. by the United States Circuit Court of Appeals, New York. The patent covers the method of using solid carbon dioxide as a refrigerating material, as a core around which the product to be preserved is packed in an insulated container. For such use only carbon dioxide purchased from the Dry Ice Corp. may legally be used.

British Chemical Overseas Trade in March

Big Rise in Re-Exports

A FEATURE of British overseas trade in chemicals during March, as revealed by the Board of Trade returns, is an increase of £166,602 in the value of re-exports as compared with March 1929, and £168,129 over the corresponding 1928 figures. The figure is the more remarkable as the total trade in this section was only £243,047. Exports at £2,011,080 showed a sharp drop of £209,546 compared with a year ago and imports at £1,316,379 declined by £12,025.

Imports

	Quantities Month ended March 31, 1929.	Quantities Month ended March 31, 1930.	Value Month ended March 31, 1929. £	Value Month ended March 31, 1930. £
CHEMICAL MANUFACTURES AND PRODUCTS—				
Acetic anhydride .cwt.	1,471	240	50,691	821
Acid Acetic .....tons		1,729		66,206
Acid Tartaric .....cwts.	3,575	2,706	25,348	17,512
Bleaching materials ,,	10,917	5,806	10,720	8,258
Borax..... ,,	12,317	26,570	9,478	15,441
Calcium Carbide... ,,	45,058	73,386	27,468	44,681
Coal Tar Products value	—	—	51,230	2,489
Glycerine, Crude ..cwt.	240	1,260	533	2,272
Glycerine, Distilled ,,	404	820	1,076	2,080
Red Lead and Orange Lead.....cwt.	3,449	5,340	4,575	8,902
Nickel Oxide..... ,,	89	45	348	216
Potassium Nitrate (saltpetre) .....cwt.	6,824	11,725	7,048	11,565
Other Potassium Compounds .....cwt.	400,594	520,294	108,384	131,017
Sodium Nitrate ... ,,	374,062	51,313	186,210	24,569
Other Sodium Compounds ..... ,,	42,537	27,845	32,736	19,164
Tartar, Cream of .. ,,	4,271	2,834	19,062	13,822
Zinc Oxide .....Tons	837	1,132	24,944	32,804
All other Sorts ..value	—	—	274,048	270,057
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .....oz.	135,008	134,874	10,901	9,858
Bark Cinchona (bark Peruvian, etc. ..cwt.	384	1,510	1,397	6,597
Other Sorts .....value	—	—	122,644	191,403
DYES AND DYESTUFFS—				
Intermediate Coal Tar Products .....cwt.	342	104	4,545	1,284
Alizarine ..... ,,	48	45	1,243	1,781
Indigo, Synthetic . ,,	—	—	—	—
Other Sorts ..... ,,	3,128	4,994	68,555	112,045
Cutch ..... ,,	5,999	5,580	9,803	9,228
Other Dyeing Extracts cwt.	3,772	3,260	10,589	11,418
Indigo, Natural ... ,,	—	—	—	—
Extracts for tanning ,,	71,475	106,994	86,476	105,418
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground... cwt.	40,898	52,185	8,147	10,776
White Lead (dry).. ,,	14,721	14,914	25,415	26,698
All Other Sorts.... ,,	108,893	119,835	144,790	157,997
Total of Chemicals, Drugs, Dyes, and Colours..... value	—	—	1,328,404	1,316,379

Exports

CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid, Sulphuric ... cwt.	1,825	14,169	1,896	4,028
Acid, Tartaric..... ,,	1,581	655	11,428	4,604
Ammonium Chloride (Muriate) ..... tons	297	326	6,254	6,767
Ammonium Sulphate—				
To Spain and Canaries tons	6,470	12,424	65,174	104,250
,, Italy..... ,,	491	383	4,578	3,347
,, Dutch East Indies tons	891	1,065	9,446	9,873
,, China (including Hong Kong) tons	11,696	7,959	123,600	71,418
,, Japan..... ,,	13,467	12,821	139,779	118,661
,, British West India Islands and British Guiana tons	493	749	5,015	6,320
,, Other Countries ,,	3,676	11,113	38,075	96,811
Total ..... ,,	37,184	46,514	385,667	410,680

	Quantities Month ended March 31, 1929.	Quantities Month ended March 31, 1930.	Value Month ended March 31, 1929. £	Value Month ended March 31, 1930. £
Bleaching Powder ... cwt.	51,131	43,477	15,247	12,765
COAL TAR PRODUCTS—				
Anthracene ..... ,,	—	—	—	—
Benzol and Toluol galls.	22,250	11,638	2,037	2,004
Carbolic Acid ..... cwt.	Cwt. 3,801		28,313	9,176
Cresylic acid .....galls.	18,674	130,026		16,339
Naphtha ..... ,,	7,657	4,552	827	541
Naphthalene (excluding Naphthalene Oil) cwt.	9,889	12,549	4,266	4,610
Tar Oil, Creosote Oil, etc. .....galls.	4,496,147	2,099,868	126,646	53,822
Other Sorts ..... cwt.	26,156	15,328	12,457	13,944
Total ..... value	—	—	174,546	100,436
Copper, Sulphate of..tons	9,217	7,717	232,068	185,984
Disinfectants, Insecticides, etc. ..... cwt.	32,093	37,647	76,681	74,442
Glycerine, Crude .... ,,	630	26	861	65
Glycerine, Distilled .. ,,	8,138	6,950	21,740	19,303
Total .....value	8,768	6,976	22,601	19,368
POTASSIUM COMPOUNDS—				
Chromate and Bichromate..... cwt.	1,655	929	3,311	1,840
Nitrate (Saltpetre) ,,	1,036	767	1,918	1,527
All other Compounds ,,	4,871	3,613	12,651	14,012
Total ..... ,,	7,562	5,309	17,880	17,379
SODIUM COMPOUNDS—				
Carbonate ..... cwt.	412,350	407,246	116,182	108,200
Caustic..... ,,	131,010	162,788	93,927	111,570
Chromate and Bichromate..... ,,	1,821	3,444	2,900	5,501
Sulphate, including Salt Cake..... cwt.	32,861	16,077	4,153	2,231
All other Compounds ,,	77,463	58,767	80,761	62,564
Total ..... ,,	655,505	648,322	303,923	290,066
Zinc Oxide ..... tons	191	240	7,016	7,902
Chemical Manufactures,etc. all other Sorts ....value	—	—	294,325	265,789
Total of Chemical Manufactures and Products, (other than Drugs and Dyestuffs) .value	—	—	1,549,532	1,400,210
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts..... oz.	134,774	216,523	13,497	21,131
Other Sorts ..... value	—	—	242,147	218,039
Total .... .. ,,	—	—	255,644	239,170
DYES AND DYESTUFFS—				
Products of Coal Tar cwt.	14,557	8,517	85,354	68,727
Other Sorts ..... ,,	7,116	10,296	7,030	12,362
Total ..... ,,	21,673	18,813	92,384	81,089
PAINTERS' COLOURS AND MATERIALS—				
Barytes, ground .. cwt.	1,995	3,031	1,179	1,274
White Lead (dry).. ,,	6,004	1,781	11,891	3,657
Paints and colours, in paste form ... ,,	45,069	32,516	89,037	62,949
Paints and Enamels Prepared ..... cwt.	42,371	42,816	133,436	134,173
All other Sorts .... ,,	48,807	48,207	87,523	88,558
Total ..... ,,	144,246	128,351	323,066	290,611
Total of Chemicals, Drugs, Dyes and Colours....value	—	—	2,220,626	2,011,080

Re-Exports

Chemical Manufactures and Products—	Quantities Month ended March 31. 1929.	1930.	Value Month ended March 31. 1929.	1930.
Acid, Tartaric..... cwt.	83	198	696	1,369
Borax..... ,,	860	1,800	603	1,175
Coal Tar Products value	—	—	2	55
Potassium Nitrate cwt.	1,419	53	1,370	64
Sodium Nitrate ... ,,	339	243	185	120
Tartar, Cream of .. ,,	382	269	1,894	1,462
All other Sorts ...value	—	—	17,753	197,440
Drugs, Medicines, etc.—				
Quinine and Quinine Salts.....oz.	18,782	5,051	2,005	610
Bark, Cinchona....cwt.	569	397	3,140	5,069
All other Sorts....value	—	—	35,116	26,166
Dyes and Dyestuffs—				
Cutch .....cwt.	1,926	1,573	3,223	2,427
All other Sorts .... ,,	384	184	3,946	776
Indigo, Natural ... ,,	6	11	138	262
Extracts for Tanning ,,	502	1,371	716	1,554
Painters' Colours and Materials . ....cwt.	1,445	945	5,525	4,239
Total of Chemicals, Drugs, Dyes and Colours .. value	—	—	76,445	243,047

Manufacture and Uses of Mastic Asphalt

Chemical Engineering Group Papers

Two papers on "The Principles of the Manufacture of Mastic Asphalt," by Alan W. Attwooll, and "Experience with some Applications of Mastic Asphalt in a Chemical Works," by Donald McDonald, were read on Friday, April 11, at the meeting of the Chemical Engineering Group of the Society of Chemical Industry, at the Chemical Society's Rooms, Burlington House, London. Below we give some extracts from these papers and points from the discussion which followed.

At the outset of his paper on the manufacturing principles of mastic asphalt, Mr. Attwooll said the term "asphalt" has often been considered to be interchangeable with other words like bitumen, tar, and pitch, and many unsatisfactory definitions have been put forward both here and in America, and both inside and outside the trade. Of recent years, however, the British Engineering Standards Association has put matters straight as far as Britain is concerned, and attempts are being made to obtain international agreement.

The British Engineering Standards Association's definitions are as follows: (*a*) Bitumen: Mixtures of natural and pyrogeneous hydrocarbons, and of their non-metallic derivatives, which may be gaseous, liquid, viscous, or solid, but must be completely soluble in carbon disulphide. (*b*) Asphaltic bitumen: Natural or naturally occurring bitumen or bitumen prepared from natural hydrocarbons or from derivatives of natural hydrocarbons by distillation or oxidation or cracking; solid or viscous, containing a low proportion of volatile products possessing characteristic agglomerating properties, and substantially soluble in carbon disulphide. (*c*) Asphalt: Natural or mechanical mixtures in which the asphaltic bitumen is associated with inert mineral matter.

The last definition is very wide, and embraces several differing types of material which are distinguished by suitable prefixes to the word asphalt. Native or rock asphalt is a natural product occurring as far apart as Cuba and Asiatic Russia, but the main commercial sources are in France, Switzerland and Italy.

This is the material which we see being tamped down as a brown powder in the London streets. The best forms, those suitable for paving purposes, carry 10 to 11 per cent. of bitumen soluble in carbon disulphide, so evenly impregnated through the carboniferous limestone base that the surface appears quite homogeneous and there is no trace of "tackiness."

Properties of Mastic Asphalts

The great distinction between rock and mastic asphalts is that, while in the former the incorporation of the bitumen and the mineral base has been effected by nature, in the latter it takes place mostly by human agency and, as is not unusual, is not nearly so thorough. In rock asphalt the incorporation or impregnation is so intimate and complete that the material can be ground to powder and then reconverted into its original form simply by compression. With mastic the incorporation cannot be taken far, and we get, not a rock, but a viscous semi-solid, which has to be melted before it can be laid, but which, nevertheless, has some very desirable properties.

Mastic asphalts may be roughly divided into three classes: materials designed exclusively for building work—*i.e.*, roofing and dampcoursing; those for paving and flooring; and, thirdly, acid-resisting asphalts. The first mastic mixtures were composed entirely of rock asphalt and an asphalt cement, and had a limited field of application. Presumably it was considered that the excellent qualities imparted by nature made the rock asphalt the most suitable base, needing only a relatively small quantity of added bitumen to produce the necessary plastic consistency. This theory became well established, and still exists among many authorities, both inside the industry and those who have to specify asphalt. Recent research has shown, however, that there is little to support this. The modern tendency is to seek improvement and efficiency in mastic mixtures rather than rely blindly on old-fashioned theories. The position is that manufacturers are often compelled to employ rock asphalt and guarantee their products as based on such materials, while their experience shows such a practice to be technically unsound.

Fineness of Aggregate

Early technical investigation showed that a certain degree of fineness in the aggregate was necessary to obtain a smooth finish and general efficiency in practice. Theoretically, the aggregate should be as fine as possible, but this has definite practical and commercial objections. The finer the aggregate, the greater the percentage of bitumen required, which naturally affects the economic aspect. When the fineness of the aggregate exceeds a certain degree, the mastic is more difficult to remelt, and has a tendency to set quicker, with the result that the finish obtained is often not as good and the mastic loses some of its pliability.

There is no "short cut" to the production of efficient and stable materials. The whole matter is one of wide practical experience coupled with careful and thorough testing. I have often been asked why pure silica is not always employed as an aggregate, as this would definitely obviate any trouble arising from the aggregate, and attention need only be paid to the asphalt cement. This, of course, is entirely a commercial question. It is necessary, as the result of keen competition, to produce acid-resisting asphalts as cheaply as may be consistent with efficiency, and certain granite and slate fillers are cheaper than pure silica. In many cold and weak liquor propositions these materials are quite satisfactory when protected by asphalt cement, although they contain acid soluble salts. Such materials form the basis of normal grades of acid-resisting mixtures while a silica base is used in the high-grade products for high temperature and strong liquor work.

What is the cause of the surface disintegration which sometimes appears on tank linings, and what do the liquors take up as a result of this "rotting"? It is difficult to generalise on this, as it depends to some extent on the asphalt and on the liquor employed. Where the aggregate is absolutely stable only the asphalt cement is affected. Bitumens are complex hydrocarbons based on carbon, hydrogen, oxygen, and in some cases sulphur, their order in accordance with the percentages of each present being that given above. Being

constantly in contact with strong oxidising agents such as those of certain inorganic acids and salts, these complex materials are split into simpler groups, with the consequent production of large quantities of free carbon.

Where the aggregate is not true silica and the bitumen has been attacked on the surface, the aggregate will lose its protecting skin and give up iron and kindred salts. The amount which goes into solution is very small. In some cases where manufacturers have mistakenly endeavoured to employ ordinary grades of asphalt on weak acid-liquor problems, the acid has attacked the limestone and completely "pitted" the surface without materially affecting the bitumen, and relatively large quantities of calcium chloride, etc., have gone into solution, or pockets of calcium sulphate have been formed.

Liquors for Human Consumption

The disintegration of acid-resisting asphalts is neither extensive nor rapid, nor are large quantities of undesirable products discharged into the liquor. Where asphalt has been employed for cider, etc., it has been proved that nothing was taken up by the cider, nor was the flavour or colour affected. Such cases are, perhaps, not comparable with strong liquor tanks employed in many chemical processes, but they show that asphalt linings do not readily give up unwanted products which for liquors for human consumption would be deleterious from the point of view of producing undesirable taste.

The most satisfactory method of dealing with prices from the manufacturer's and contractor's point of view is to have several specifications. Certain of these can be based on materials of average resistance to acids and temperature conditions, and will cover a vast number of propositions of medium severity. There should be specifications designed for work under more stringent conditions which would naturally cost more. The manufacturer who can undertake to investigate any problem outside the scope of his standard specification with a view to producing special materials to suit the new condition is naturally in a strong position.

Use in a Chemical Works

Mr. McDonald, who expressed his indebtedness to his employers, Johnson, Matthey and Co., Ltd., for allowing him to publish the results of their experience, referred in his paper to their first use of asphalt as a tank lining some forty years ago, and its general adoption, except in the sulphuric acid department, for tanks varying in size from 2,000 gallons to 200 gallons.

Success in tank lining, he said, depends chiefly on three factors: A proper choice of asphalt mixture to meet the conditions involved, skill on the part of the man who lays it, and an efficient key to help the lining to cling to the vertical surfaces. The first of these will be within the province of the asphalt merchant, who must be given the fullest possible information regarding what substances are going to be put in the tank and what temperatures will be reached; in most cases, his chemist will be able to decide upon a mixture at once as a result of experience. The mixtures used are rich in bituminous base and poor in mineral filler, weight resistance being sacrificed to corrosion resistance, so the mixing is comparatively easy. The amount of filler present is only sufficient to enable the product to cling to the key without flowing at the temperatures to which it will be exposed.

No Dissolution of Linings

There is no evidence that any portion of the linings dissolves in the solutions of inorganic acids and salts with which we have had experience. There are, of course, limits of concentration and temperature beyond which all the mineral acids begin to damage the lining. What happens, however, is not a dissolution, but blistering and rotting of the surface, leading eventually to holes. Concentrated sulphuric acid will rot asphalt at any temperature, presumably through charring of the bitumen.

The following are particulars of the service given by and expected from some actual tanks in use in our works. The first is used for settling a strong acid solution in ferric chloride, having approximately the following composition: Iron, 60 g. per litre; free hydrochloric acid, 62 g. per litre; copper, 6 g. per litre. The temperature varies slowly between 32° C. and normal, and there is no abrasion. The surface, after three years, is perfectly hard and smooth, and we expect a total life of at least twenty years. The same remarks apply to a similar tank used under the same conditions for settling a neutral solution of copper nitrate. Another tank is used for treating various mixed effluents with scrap iron to recover copper and traces of precious metals. The composition of the solution varies, but a fair average is represented by: Iron, 3·7 g. per litre; copper, 2·5 g. per litre; free nitric acid, 0·3 g. per litre. The temperature varies between 37° C. and normal, and there is abrasion from stirring the scrap iron. The lining after five years' service has softened slightly on the surface. This softness extends to a depth of about $\frac{1}{8}$ in., but a total life of fifteen years is expected.

The next tank has had rather more drastic treatment, being used for the precipitation of small quantities of silver from warm dilute silver nitrate washings by common salt. The temperature varies between normal and 63° C., and there is frequent stirring. The solution contains, as an average: Copper, 11 g. per litre; silver, 15 g. per litre; free nitric acid, 0·6 g. per litre; sodium nitrate, 15 g. per litre. This tank has been in use for seven years, and the lining is soft to a depth of about $\frac{1}{4}$ in. A total life of ten years is expected.

Mastic asphalt can be used to line towers and chambers for absorbing gases or for gaseous reactions in general, provided that the temperature and compositions of the substances involved are not too drastic.

Covering of Floors

Floors are the best known and widest used application of mastic asphalt in chemical works. Asphalt provides a jointless homogeneous covering which, if properly laid and treated, will remain liquor proof for years even in the presence of corrosive substances. The material differs from that employed in tank work in that it has to carry weights, and is therefore more heavily loaded with filler. As the amount of the filler is increased the product becomes progressively less resistant to corrosion, and a compromise has to be made between two somewhat incompatible factors to get the best result. Moreover, the filler, itself inert and corrosion-resisting—usually granite chippings are used—can only be incorporated in the asphalt to a limited extent, which again limits the weight-resisting property. A floor, therefore, covered with corrosion-resisting asphalt will "dent" under heavy standing loads, but this is rather an inconvenience than a defect. The depth of the dent will not be great unless the intensity of pressure amounts to several cwt. per sq. in. Loads of a cwt. or so per sq. in. will form a distinct "dent" in 12 hours, but after that the hole will not get any deeper even if the same load is applied for years.

Importance of Washing Down

Asphalt floors should be washed down at least once a week to prevent the accumulation of concentrated films and standing pools of corrosive solution. This is particularly important where solutions containing sulphuric acid are concerned. Anything which destroys the surface is detrimental to the life of the floor, and therefore these floors are not suitable for works where substances are made or handled to any extent which are solvents for bitumen, such as oils and other organic liquids. All pools and splashes of substances such as bituminous paints, tars, lubricating oils, engine oils, and so forth, should be removed from asphalt floors as soon as possible. Given proper laying and care afterwards, the life of these floors should be long.

Mastic asphalt provides an admirable medium for covering flat roofs. The absence of joints ensures that the roof is proof against weather, and the nature of the covering permits its use for light traffic and storage. For all normal requirements a thickness of $\frac{3}{4}$ in. is quite sufficient, and this is laid as usual in two separate layers each $\frac{3}{8}$ in., the general conditions to be observed being the same as those in laying a floor. The usefulness of asphalt for channels, open drains, gulleys, and sumps will be obvious. The most favourable factors are absence of joints and the resistance to corrosion. One source of weakness is, however, the fact that these articles have usually sooner or later to be made good to an earthenware pipe, and however well the asphalt is turned down into the socket of the pipe, a tight joint can never be made. The well-known use of asphalt for damp courses need hardly be enlarged upon. It can be very helpful in constructional work in ground which has become impregnated with acid. If it is necessary to lay down bases and grillages in such ground, a

thin outer coating of asphalt will ensure reliable protection to both steel and concrete.

The Discussion

Mr. E. Downs, whose interest lay chiefly with the application and life of acid-resisting asphalt, said his experience largely confirmed Mr. McDonald's statements. In the particular chemical works in which he was engaged there was at least 200 tons of asphalt doing very useful work in service in various liquors. With regard to asphalt floor coverings, he expressed the view that more depended upon the "pot" man getting the materials thoroughly mixed and of the right "flow" than upon the layer. He agreed that a floor should be laid in two layers, in order to reduce the possibility of porosity, but the strongest reason was that it ensured that the joints between any two sections did not coincide. Where a floor was laid in one layer, as was often the case, it was by no means jointless, and most of the troubles with asphalt floors appeared to come from faulty joining up of two sections of asphalt, even though both were laid within an hour of one another. One weakness of asphalt tank linings, in his experience, was that where a pipe entered such a tank, it was difficult to make good the part immediately adjoining the pipe, with the result that very often liquor was likely to creep through the joint and percolate behind the asphalt lining, with sad results.

Mr. L. H. Sensicle said he had had experience of the use of asphalt and asphaltic material for the lining of gas mains, the purpose of its use being to afford protection against corrosion, and had found that at the outset there was an absorption of oily materials from the gas to the extent of 10 or 15 per cent., the absorption varying subsequently, and apparently according to the temperature. Sometimes these oily materials were taken up from the gas and at others were given up to the gas, thus affecting slightly its calorific value, particularly in a long length of main.

Fineness and Flow

Dr. W. R. Ormandy said that, with all due deference to the possibilities of the use of bitumen, this material was not a solid; it had not a modulus of elasticity. It was a fluid, and the curve showing the flow at varying temperatures was a particularly rapidly altering curve towards the end; a small increase of temperature at a certain point produced very large variations. Some years ago he had attempted to make acid-resisting bricks out of finely ground sand and other siliceous material mixed with pitch, and had found that the material which really regulated the rate of flow was not even the material which passed through a 200-mesh sieve, but the still finer flour that could be separated by air blowing, and a very small percentage of the material corresponding in size to material which would pass through a 400-mesh sieve had a very much greater effect than a larger amount of coarser material in preventing the flow of the finished product.

Mr. Wolf, referring to the extraordinary effects of adding fillers or very fine mineral aggregate to bitumens, said that one of the fillers most commonly used was Portland cement, of which a very large proportion passed through a 200-mesh sieve, and the effect of adding gradually increasing proportions of Portland cement to bitumen was a gradual rise in the melting point, accompanied by a marked increase in hardness. If one added something very much finer, however, such as the very finest china clay (Kaolin), or if one selected certain portions of the Portland cement by air sifting, so that it was of the size which would pass a 400-mesh sieve, the rise in the melting point was very sharp. He imagined that was largely due to the fact that the extremely finely divided substances became almost part of the bitumen itself.

Mr. J. T. Anderson said that asphalt floors in chemical laboratories not only withstood the effect of the spillage of acids, but were also exceptionally comfortable to work on.

Mr. McDonald, replying to the discussion, said, as to the effects of spillages on laboratory floors, that the spilling of small quantities of substances which were solvents of bitumen did not cause much harm because they were trodden away, but if large pools were allowed to remain on the floors they would be ruined.

Mr. Attwooll did not consider the laying of floors in two layers was necessary, or that it was desirable in many cases. Defects which arose from bad joints were the fault of the workmanship rather than of the asphalt.

A Bookman's Column

Die Kuenstlichen Harze, a considerable work on synthetic resins by J. Scheiber and K. Saendig (Stuttgart: Wissenschaftliche Verlagsgesellschaft m.b.H., pp. 376. 28 marks), represents a new departure in the literature of this important subject. It is an attempt to give a scientific basis for the production of synthetic resins. An endeavour is made to define the word "resin" and to indicate the characteristic properties of these bodies. The authors then proceed to elucidate the relationship between the structure of known resins and their chemical constitution. The principal reactions which result in the formation of resins are then discussed. A good half of the book is devoted to purely theoretical considerations, but even the practical section is overshadowed by general discussions to such an extent that very few descriptions of practical processes are given. Nevertheless, it contains such a wealth of references that the reader will have no difficulty (provided that he has access to a first-class library) in finding easily the information he wants. It is a book which can be understood only by chemists possessing a sound all-round training in organic chemistry, and would be wasted on others. It will assist the reader in obtaining a thorough understanding of any class of resins in which he may be interested.

* * *

The third edition of Dr. George Lunge's *Technical Chemists' Handbook* (Gurney and Jackson, pp. 262, 12s. 6d.) has been revised by Dr. A. C. Cumming, and the revision has necessarily involved many minor alterations, though there is no change in the general scheme of the book, which consists essentially of tables and methods of analysis for manufacturers of inorganic chemical products. So many errors were discovered in the course of revision that as far as possible all figures have been recalculated. It may be mentioned that the section on "Nitric acid and nitrates" was rewritten by Mr. Allin Cottrell shortly before his untimely death.

* * *

Foreign Investments, by A. Emil Davies (A. W. Show and Co., pp. 224, 12s. 6d.), is based upon an earlier work on the same subject by the author, published in America, but it has been re-written from the point of view of the British investor. New material has been added, including chapters on American, Canadian, and European investments, and some practical hints on the subject of investment generally. Mr. Emil Davies, well-known for his association with the Co-operative Investment Trusts, has specialised in this field of investment for some years and accumulated considerable experience and facts. He gives the reader the benefit of all this, and, like most authorities, insists on caution.

* * *

Dr. John C. Ware's *The Chemistry of the Colloidal State* (Chapman and Hall, pp. 314, 18s. 6d.) is described as a text book for an introductory course. The author is Associate-Professor of Chemistry in New York University. The term "colloid" or "colloidal" chemistry caught on very easily in the United States, where the love of a new term is instinctive, and there has been a rather loose use of the term in many directions. The object here is not to deal with the advanced stages of the subject, which the author considers to be well covered, but to give the earlier student a sound introduction to the fundamentals of the subject. This is done clearly and comprehensively with the limits set by the author for his work.

* * *

Dr. Carl J. Engelder, in preparing his *Textbook of Elementary Quantitative Analysis* (Chapman and Hall, pp. 254, 13s. 6d.), was moved by a feeling that in the usual treatment of the subject matter of quantitative analysis the transition from the study of qualitative analysis to that of quantitative analysis is too abrupt and that the relation between these two divisions of analytical chemistry is frequently not sufficiently emphasised. His aim has been to bridge that gap, to develop a natural sequence of study, to show the student how his accumulated knowledge of the facts and theories of qualitative analysis are, in fact, the foundation for methods of quantitative determination. The book is intended to be a companion volume to the author's *Elementary Qualitative Analysis*, and follows the same method of treatment.

Overseas China Clay Trade

Imports, March, 1930

A RETURN showing the quantities and value of China Clay, including China stone, imported into Great Britain and Northern Ireland, as registered in the month of March, 1930, is as follows :—

COUNTRY WHENCE CONSIGNED.	QUANTITY. Tons.	VALUE. £
U.S. America	52	246

Exports, March, 1930

THE returns of exports of China Clay, including Cornish or China stone from Great Britain and Northern Ireland, from Great Britain and Northern Ireland during March were :—

COUNTRY OF DESTINATION.	QUANTITY. Tons.	VALUE £
Estonia	10	34
Sweden	889	2,915
Norway	1,344	2,964
Denmark	654	1,741
Germany	2,848	5,887
Netherlands	1,910	4,303
Java	100	260
Belgium	5,381	10,180
France	3,433	8,755
Switzerland	141	256
Portugal	22	126
Spain	2,981	7,350
Italy	2,043	4,185
Greece	75	220
China	55	257
Japan	15	176
United States of America	18,504	40,419
Mexico	65	263
Argentine Republic	694	900
Union of South Africa	2	28
British India	2,697	9,070
Madras	10	40
Bengal, Assam, Bihar and Orissa	409	1,604
Australia	35	249
Canada	35	156
	44,352	102,343

Secret Process or Common Knowledge

An Injunction Applied for

IN the Chancery Division, before Mr. Justice Luxmoore, on Friday, April 11, Mr. Gavin Simonds, K.C. (with whom was Mr. Hunt), on behalf of the Marb-l-Cote Distributing Corporation, plaintiffs in an action against Coleman Goodman, Mrs. Gladys Goodman, and Sidney Goodman, moved for an injunction to restrain the defendants from manufacturing Marb-l-cote or any product incidentally related or similar to Marb-l-cote.

Mr. Simonds said the motion sought to restrain defendants from manufacturing in accordance with a secret process, knowledge of which was alleged to have been obtained by the first defendant, while in the employment of the plaintiff company as managing director. The issue was whether plaintiffs had a secret process and defendants said they had not.

Mr. Radcliffe, for defendants, said that was one of the issues.

Mr. Simonds said the defendants asserted that this was a matter of common ingredients known to everyone and that there was no secret about it. Mr. Coleman Goodman was the principal defendant, Mrs. Gladys Goodman was his wife, and Mr. Sidney Goodman his brother, and they were all carrying on business as the Plastic Manufacturing Co. The plaintiffs' case was that they were making plastic paint in accordance with a secret process which was the property of the plaintiff company, and that the first defendant acquired his knowledge of the process while in their employment. That employment was subsequently terminated.

The defence was that no process of the plaintiffs' was being used by the defendants. The ingredients they used were common commercial products bought by the ton from manufacturing chemists. He had no intention of manufacturing or selling Marb-l-cote or divulging any secret information acquired while in plaintiffs' employment.

His Lordship said if plaintiffs had no secret process an injunction against the defendants would not hurt them. He would grant an injunction until the trial of action or further order restraining the defendants from using the whole or any material part of the plaintiffs' secret method or process of manufacturing plastic paint, the knowledge of which was acquired or obtained by the first defendant during his employment by the plaintiff company and for disclosing any information with respect thereto, and in the case of the first defendant, from disclosing any confidential information with regard to the appliance, machinery, plant or material used in connection with the plaintiffs' business. The costs of the motion would be costs in the action.

Chemical Opinions on the Budget

Restrictive Effect on Industry

INQUIRIES in various branches of the chemical industry show that while the Budget does not directly affect the industry itself, its effect on trade generally will be restrictive. Sir Max Muspratt, a director of Imperial Chemical Industries, thinks that the retention of the McKenna and silk duties will mean increased employment for the next few months and that when the ordinary safeguarding duties fall out the Labour Party will be too sensible to abolish all safeguarding, a matter which he regards as of vital importance to the industrial development of this country. The increase in the Income Tax he accepts as inevitable and care appears to have been taken that the incidence should fall upon the smallest possible number of people. As a middle-class Budget, Sir Max Muspratt regards it as quite sound.

Although the Association of British Chemical Manufacturers has not expressed any official opinion, there is a general sense of relief that there is to be no interference with the duties chargeable under Part I of the Safeguarding of Industries Act which relates to synthetic organic chemicals, reagents and fine chemicals generally. Satisfaction is also expressed that the much discussed tax on petrol has not been introduced, as this would have a considerable effect on chemical manufacturers. It was not expected that any reference would be made to the Dyestuffs Act under which all foreign dyestuffs have to be imported under licence, but some importance is attached to the fact that the Chancellor did not indicate any decision not to renew the Act in some form or another.

The British Chemical and Dyestuffs Traders' Association have also not recorded any official opinion on the Budget, but an exact knowledge of what conditions for the coming year will be, removes the sense of uncertainty which for the past six weeks or two months has been having a distinct effect on chemical trade. As regards imports of foreign chemicals, conditions remain exactly the same as before.

Mr. J. Arthur Reavell, President of the Institution of Chemical Engineers, expresses the opinion that the Budget is bound to affect national trade prejudicially. Owing to the large amount of research now proceeding, new development and processes are constantly coming to light and it is essential, if these are to be taken up for the benefit of national industry, that industrial concerns should be allowed to accumulate adequate reserves. Unless such reserves are available for new enterprises they become almost impossible on account of the expense involved in financing them. By cutting into these reserves the Budget restricts the power of industries to undertake new developments, and that, of course, is inevitably bad for national progress and development.

Mr. C. A. Hill (chairman of British Drug Houses, Ltd.) states :—Mr. Snowden's Budget administers a vicious kick to industry at a time when, weakened by bad times and taxation already sufficiently grievous, it is struggling to emerge from a deep and world-wide depression. It is idle to deny that the increase in Income Tax is a tax on industry, and that other statements included in the Budget will tend to increase unemployment. The Budget as a whole produces that feeling of hopelessness which recalls the occasion when the Excess Profits Duty was raised from 60 to 80 per cent.

Sodium Silicate Trade in Estonia

A SMALL plant for the manufacture of sodium silicate is in operation in Estonia ; nevertheless, most of that consumed is still imported chiefly from Germany and Norway. The value of imports in recent years was $2,855 in 1926 ; $1,607 in 1927 ; $2,403 in 1928. Sodium silicate is used in Estonia by soap factories, cloth mills, and wood-working, as a fire-proofing agent, stone manufacturing, and paper industries.

From Week to Week

SIR WILLIAM ALEXANDER, M.P., we are pleased to record, is making satisfactory progress after his recent operation and hopes to leave the nursing home at the end of this week.

NORTHAMPTON TOWN COUNCIL has decided to appoint an analytical chemist at a salary of £300 to £350 a year to make analyses and carry out other work in connection with the treatment of sewage.

SIR SAMUEL HOARE, M.P., has accepted nomination as President of the British Science Guild in succession to Lord Melchett. The election will take place at the annual meeting of the Guild in a few weeks' time.

THE NEXT GENERAL MEETING of the I.G. Farbenindustrie is announced for May 22, when Director Scheiffer and Herr J. Goldschmidt, representatives of the leading German banks, are expected to be elected to the board.

"CHEMISTRY AND THE QUANTUM THEORY" is the subject of the Faraday Lecture to be delivered by Professor Dr. Niels Bohr, For.Mem.R.S., before the Chemical Society at the Salters' Hall, St. Swithin's Lane, London, on Thursday, May 8.

EXPERIMENTAL RESEARCH abroad is to be undertaken by the Tin Industrial Applications Committee which will also aid in the development of new processes and industries consuming tin and stimulate possible markets. Expert advice will be given free to any firms or persons desiring it.

IN THE SWEDISH PULP INDUSTRY new record figures for production and export were shown in 1929. The position of sales for delivery during 1930 was particularly satisfactory at the turn of the year. On the other hand, the level of prices for chemical pulp was weaker than during the early autumn.

THE VOLUME of work flowing into the Patent Office had surpassed all previous records, said Sir William Jarratt, Comptroller-General of Patents, Designs and Trade Marks, at the annual dinner of the Chartered Institute of Patent Agents in London, on Monday. Good patent law, he added, was essential, and ours was the best in the world.

THE BALLOT for the vacant position of secretary of the Amalgamated Society of Dyers has resulted as follows: Mr. E. Verity (Bradford), 9,308; Mr. George Bagnall (Lancashire), 8,353; Alderman M. F. Titterington (Bradford), 3,211. Mr. Verity has been acting secretary since the death of Mr. William Rushworth, and was previously President of the Society.

MUREX, LTD., is making an issue to existing shareholders of 25,000 shares of 10s. each, at the price of £2 per share, to provide additional funds to meet expenditure on extensions and increase of plant, and to finance larger stocks of high-priced materials. It is understood that assurances have been given to Imperial Chemical Industries and other principal holders which ensure that more than 50 per cent. of the new shares will be subscribed.

THE REGISTRATION is now announced of the Bankers Industrial Development Co., Ltd., formed to receive and consider schemes submitted by the basic industries of the country for the purpose of their rationalisation, either by industries or by regions. Mr. Montagu Norman will be chairman and among five other directors is Mr. C. Bruce Gardner, who was on the boards of British Basic Slag, Ltd., New Acid Co., Ltd., and the Staffordshire Chemical Co., Ltd.

A COPPER FAMINE by 1935–40 at the latest, if the work of establishing new sources of supply did not proceed regularly, was predicted by Sir Auckland Geddes who presided at the 57th meeting of the Rio Tinto Co., Ltd., in London on Monday. As regards sulphur, he said, he looked for a period of anxiety and difficulty in the pyrites trade with the development of by-product brimstone and the company had taken all the steps they could think of in advance to meet it.

AN EXPLOSION in the chemical laboratory at the new Secondary School for Girls at Barbourne, Worcester, was reported at the meeting of the Worcester Education Committee last week. It was stated that the school was closed for the holidays at the time and a boy laboratory attendant was alone in the room experimenting with potassium chlorate and sulphur when the explosion occurred. His hand was cut and his face burnt, and the panes of the window were blown out. The boy was taken to the local infirmary, but was sent home after treatment.

THE MARRIAGE will take place, this month, of Mr. Keith Batty, managing director of the Castner Kellner Alkali Co., to Miss M. Glover, of Frodsham.

MR. ALEXANDER T. S. ZEALLEY, of Norton-on-Tees, process manager of Synthetic Ammonia and Nitrates, Ltd., has been appointed a Justice of the Peace for Stockton.

RECENT WILLS include: Mr. M. C. H. Ashby, Crowborough, chairman of Morris Ashby, Ltd., manufacturing chemists, Laurence Pountney Lane, London, E.C. (net personalty £32,298), £106,414.

DRUGS of an estimated value of between £20,000 and £30,000 have been seized and confiscated at the principal ports of the country during the past fortnight as the result of the special stringency of Customs officials and police.

THE TWENTIETH ANNUAL MAY LECTURE of the Institute of Metals will be given on Wednesday, May 7, by Major F. A. Freeth, F.R.S., on "The Influence of Technique on Research." Tickets may be obtained from Mr. G. Shaw Scott, Secretary of the Institute, Members' Mansions, Victoria Street, S.W.1.

MR. CORNELIUS VANDERBILT is reported to have stated that there is a possibility of international complications as the result of the discovery of radium deposits, valued at £200,000,000, in the South Polar Regions during the recent Byrd expedition. He declares that a British Expedition has been sent to verify the discovery.

A PAMPHLET on the projected reform of the nomenclature of organic chemistry by M. Victor Grignard has been published (in French) by the Fédération Nationale des Associations de Chimie de France. The final vote on the question is being taken at the international conference at Liége in September and it is hoped that delegates from all countries will discuss it fully beforehand.

MR. R. G. BOWYER, the president, speaking at a meeting of the Chemical Workers' Union in London on Saturday, said that there must come a time when the workers in the chemical industry would say whether or not war would be possible. They need not fear that it would result in unemployment if they did not produce the means by which men slaughtered their fellow-men.

FELLOWSHIPS available for chemists of post-graduate standing, and intended to afford additional and special training at home or abroad preparatory to a career in industrial chemistry, are offered by the Salters' Institute of Industrial Chemistry. Further particulars of these, and of educational grants offered by the Institute to young men or women employed in chemical works in or near London, will be found in our advertisement section.

THE DEAD SEA CONCESSION was cited in the official statement of the Palestine Arab Delegation which recently interviewed members of both Houses of Parliament in London, as an instance of how different conclusions might have been reached by the Palestine Commission. They declare that the Commissioners had studied, it seemed, the Novomeysky concession alone, without studying the proposals of other groups who offered much better terms, and saw only one side of the question.

SOUTHAMPTON WILL BE the scene of this year's meeting of the Institute of Metals, which is being held, by invitation of the Mayor and Corporation, from September 9–12. At the morning sessions a dozen papers of metallurgical and engineering interest will be presented for discussion. The afternoons will be devoted to visits to works in the neighbourhood of Southampton, and to motor and sea trips. A novel excursion is being arranged for the week-end following the meeting, this taking the form of a trip to France and back in Atlantic liners. The party will cross to Cherbourg on September 13 in the *Mauretania*, the return passage being made on September 16 in the *Berengaria*.

IT IS REPORTED that the directors of the Kali Sainte Therese will shortly raise the capital of the company from 40 million to 80 million francs through the issue of new shares. This action is due to the desire of the board to bring the capital more in accord with the development of the company. The production for the first 11 months of 1929 was approximately 780,000 metric tons of crude potash salts, compared with 700,648 tons for the entire year of 1928. The company contemplates important increases and, according to the president, production will be doubled within the next five years.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

324,935. CARBOXYLIC ACIDS. H. A. E. Drescher, D. A. W. Fairweather, J. Thomas and Scottish Dyes, Ltd., Earl's Road, Grangemouth, Scotland. Application date, August 4, 1928.

An alkaline earth metal salt of a diaryl-ketone carboxylic acid is heated for a short time with an alkaline earth metal oxide or hydroxide to obtain carboxylic acids. Substituted carboxylic acids are obtained if substituted ketone carboxylic acids are used. Thus, α-naphthoyl-*o*-benzoic acid yields α-naphthoic and benzoic acids, and *o*-benzoyl benzoic acid yields 2 molecules of benzoic acid.

324,939. HYDROCARBONS. T. S. Wheeler, Wynthorpe, Woodlands Road, Hartford, Cheshire, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, September 3, 1928.

Saturated hydrocarbons are decomposed by heat to produce aromatic hydrocarbons such as benzene, which is removed from the gas. Hydrogen is then removed by passing the gas over material, such as copper oxide, which reacts with hydrogen but not with the hydrocarbons. Thus methane may be passed through a tube heated to 1,000° C. at a high space velocity. Light oils are condensed and the hydrogen is separated by diffusion, or by adding carbon monoxide and treating with a nickel catalyst.

324,962. ARYL-SULPHONIC ACID AMIDES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 5, 1928.

Aryl-sulphonic acid amides or derivatives, or substitution products in which the hydrogen atoms of the amino group may be wholly or partly replaced by alkyl, aryl or aralkyl groups, are used for moth-proofing wool, fur, hair, etc. All the nuclei may contain further substituents, including aryl and aralkyl residues containing one or more sulphonic acid amino groups, *e.g.*, a compound of the general formula $R.SO_2NH.R.SO_2.NR_1R_2$, in which R represents an aromatic nucleus and R_1 and R_2 represent hydrogen, alkyl, aryl, or aralkyl. The material is treated with these compounds or their alkali salts in an acid bath, or in solution in organic solvents. The aryl-sulphonic acid amides are made by the interaction of aryl-sulphonic acid halides with the corresponding bases. A description is given of the preparation of a number of sulpho-chlorides and their use in obtaining the sulphonamides.

324,964. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 8, 1928.

The process is for obtaining substitution products of 3 : 4 : 8 : 9-dibenzpyrene-5 : 10-quinone. The nitro groups in mononitro 3 : 4 : 8 : 9-dibenzpyrene-5 : 10-quinones are replaced directly by halogen atoms in the absence of any diluting medium, or in the presence of an organic diluent; in this reaction further halogen atoms may enter the molecule. Alternatively, the nitro groups may be reduced to amino groups, and these replaced by monovalent radicles, *e.g.*, cyano, thiocyano, mercapto and hydroxy groups, by means of the diazo reaction. Further products containing hydroxy groups may be etherified with dimethyl sulphate, or with esters of *p*-toluene sulphonic acid, such as the methyl, ethyl, ethylene, chlorethylene, and phenyl esters. In an example, mononitro-3 : 4 : 8 : 9-dibenzpyrene-5 : 10-quinone is boiled with benzoyl chloride to obtain the monochlor derivative, which dyes cotton yellow. If the mononitro derivative is treated with chlorine in trichlor-benzene, the dichlor derivative is obtained. If the mononitro derivative is reduced to the monoamino compound, diazotised, and treated with potassium iodide, the mono-iodo derivative is obtained. Similar dyestuffs are obtained by using cuprous chloride or bromide. If the monoamino compound is diazotised and the diazo solution warmed, the mono hydroxy derivative is obtained, which differs from that previously known and has little affinity for vegetable fibres. The monohydroxy derivative may be methylated by means of *p*-toluene-sulphonic methyl ester to obtain a product which gives orange shades on cotton. The monoamino compound may also be diazotised and treated with potassium thiocyanate or cuprous cyanide to obtain the thiocyano and cyano derivatives.

325,204. DYES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, September 10, 1927.

Monoazo dyes derived from 2:5:7-aminonaphthol sulphonic acid or an N-substituted derivative as coupling component are treated with an agent or agents yielding more than one metal, other than magnesium, to obtain products suitable for dyeing cotton or colouring varnishes. In an example, the dyestuff 5-nitro-2-amino-phenol ⟶ phenyl-(or 4^1-tolyl) 2 : 5 : 7-acid is boiled with a solution of copper and nickel sulphates and then with a solution of chromium fluoride; the nickel sulphate may be omitted. The product dyes cotton blue from a neutral or alkaline Glauber's salt bath.

325,207. CARBON BLACK. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 3, 1928.

Unsaturated hydrocarbons or gases containing them are treated at low or moderate temperatures with a dehydrogenating catalyst consisting of a metal or oxide of the iron group with an activating addition, such as metal carbonates, oxides, or hydroxides, *e.g.*, oxides of cadmium, zinc, copper, aluminium, vanadium, uranium, and thorium, manganous oxide, chromic oxide, alkaline earth oxides, caustic alkalies, silicates, chromates, molybdates and tungstates. Cobalt catalysts are particularly suitable with additions as above, and may be used in the homogeneous state or on a carrier. Such catalysts give a very finely divided and deep black carbon. The temperature may be 300°—450° C., and pressure up to 100 atmospheres may be used. Hydrocarbons such as olefines, diolefines, acetylene or its homologues, may be used, and other gases or vapours may also be present. The decomposition may be effected at low temperatures, *e.g.*, 25° C., if the pressure is high. The hydrocarbons may be derived from thermal decomposition of gaseous aliphatic hydrocarbons such as methane, ethane, or propane, or by cracking gas oils, benzines, gasolenes, tars, mineral oils, etc. Several examples are given of the production of carbon black suitable for making printing and other inks, and in the rubber industry.

325,208. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 7, 1928.

Diazotised sulphonated *o*-aminophenols or *o*-aminonaphthols, or their derivatives which are free from carboxylic groups, are coupled with unsulphonated *p*-substituted phenols which are free from carboxylic and amino groups and do not contain more than two rings. The products are *o*-oxyazo dyestuffs which are capable of conversion into complex metal compounds. The latter dye wool in fast yellow-brown to violet shades, and have good equalising properties. They may also be used for dyeing leather, printing on cotton, and making colour lakes. A large number of these dyestuffs are described, and particulars are given of the dyeings obtained with them. Reference has been directed to Specifications Nos. 104,743 and 269,934.

325,209. CELLULOSE ACETATE. Dr. A. Wacker Ges., für Electrochemische Industrie Ges., 20, Prinz-regentenstrasse, Munich, and W. Gruber, Burghausen, Oberbayern, Germany. Application date, October 11, 1928.

Cellulose acetates insoluble in acetone are treated with an acid salt containing water of crystallisation of a heavy metal of the 1st and 2nd groups, with or without another acid salt or neutral salt. The products are highly viscous cellulose acetates soluble in acetone. Thus, a solution of cellulose triacetate in glacial acetic acid may be treated with $ZnCl_2.HCl.-2H_2O$ at 20° C. until the product is soluble in acetone. The corresponding mercury salt may also be us:1

325,222. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 8, 1928.

Monoamino-3 : 4 : 8:9-dibenzpyrene-5 : 10-quinones are condensed with organic compounds containing negative substituents in an organic medium and in the presence of an acid fixing agent and a catalyst. The organic compounds referred to may be halogen and nitro compounds and carboxylic acids of aliphatic, cyclo-aliphatic, aromatic and heterocyclic compounds, the negative substituents being either attached to the nucleus as in chlorbenzene, α-or β-chloranthraquinone, or α-nitronaphthalene, or to a side chain as in benzyl chloride, benzal chloride, benzo-trichloride or naphthalene carboxylic acid halides. If aliphatic compounds containing a negative substituent are employed, such as methyl iodide, ethyl chloride, ethylene bromide, or the alkyl esters of toluene sulphonic acid, alkylamino derivatives of 3:4:8:9-dibenzpyrene-5 : 10-quinone are obtained. Further, there may be several negative substituents in the organic compounds and several molecular proportions of the amino-dibenz-pyrene-quinones may be employed. The acid fixing agent may be alkali metal carbonate or acetate, and the condensing catalyst may be copper, mercury, aluminium, or their oxides or carbonates. Examples are given of the condensation of monoamino-3:4:8:9:-dibenzpyrene-5:10-quinone with benzoyl chloride, *m*-methoxy-benzoyl chloride, 1-chlor-anthraquinone-2-carboxylic chloride, 1-chlor anthraquinone, cyanuryl chloride, 1:amino-or 1-nitro-anthraquinone-2-carboxylic chloride, the dichloride of oxalic acid, monobrom-benzene, octobrom-cyclohexane, trichlor-anthraquinone-2:1-benzacridone, and several others.

325,234. CATALYSTS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 8, 1928.

Catalysts for oxidising hydrocarbons are obtained by treating a slightly acid solution of a neutral metallic salt with a solution of a salt of an oxygen-containing inorganic acid with sufficient alkali to give a slight excess in the mixture. Thus a mixture of cerium, cadmium, and aluminium nitrates may be precipitated by alkali metal phosphate, and a mixture of zinc and iron nitrates may be precipitated by means of sodium tetraborate.

325,250. DYES AND INTERMEDIATES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 9, 1928.

The nitro groups in nitro-pyranthrones or substitution products are replaced either directly by halogen, or by halogen, hydroxy, mercapto, cyano, or thiocyano groups by means of the diazo compounds of the intermediately formed pyranthrones. The nitropyranthrones may be treated with halogen or halogenating agents, and further halogenation can be effected at higher temperatures and pressures. The hydroxy-pyranthrones can be alkylated or arylated to obtain dyes. Several examples are given of the production of mononitro-pyranthrone, tetranitro-pyranthrone, and other similar compounds.

325,266. ORGANO-MERCURY COMPOUNDS. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 15, 1928.

Benzene is heated with mercuric acetate, or mercuric oxide and glacial acetic acid, in the presence of an inert solvent such as nitrobenzene which raises the reaction temperature, without using pressure, to the best value of 130°-135° C., whereby phenyl-mercuric acetate is obtained.

325,267. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 15, 1928.

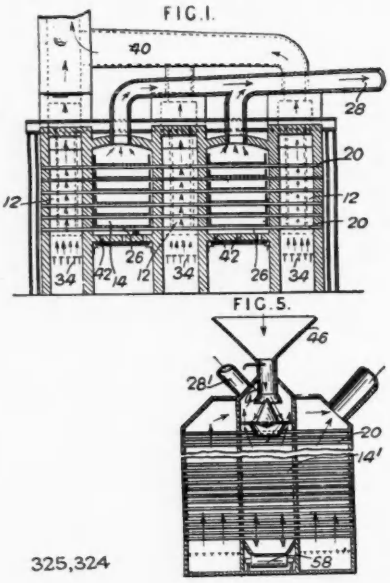
This process is for obtaining carbazole derivatives of 1 : 1^1-dianthraquinonyl-amino-acridones containing no acylamino groups, but containing two acridone rings in the 3 : 4 (N) : 3^1 : 4^1 (N) positions. In an example which illustrates the process, 1 : Bz2 : Bz4-trichlor-3 : 4 (N)-anthraquinone-acridone, which is obtained by chlorinating the anthraquinone-acridone in nitrobenzene, is condensed with 1-amino-Bz2 : Bz4-dichlor-3 : 4 (N)-anthraquinone-acridone. The latter is obtained by condensing 4 : 6-dichlor-anthranilic acid with 1-amino-4-brom-anthraquinone-2-sulphonic acid, effecting ring closure with sulphuric acid, and splitting off the sulpho group by reducing agents or heating. The condensation product first referred to is treated with concentrated sulphuric acid and sodium nitrite or chromic acid, and the carbazolised product dyes cotton in fast green shades.

325,309. SEPARATION OF GAS MIXTURES CONTAINING UNSATURATED HYDROCARBONS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, November 26, 1928.

Gases containing hydrocarbons which have been thermally treated to obtain a mixture of unsaturated hydrocarbons and hydrogen, are treated with solid adsorbents at increased pressure to absorb the unsaturated hydrocarbons. Thus, gas obtained in the destructive hydrogenation of coal is treated in the electric arc to obtain a mixture containing 8 per cent. of acetylene. This is adsorbed in active charcoal under a pressure of 20 atmospheres.

325,324. HEAT TREATMENT OF CARBONACEOUS MATERIALS. W. E. Trent, 52, Broadway, New York. Application date, December 8, 1928.

The apparatus is for distilling coal, oil shale, or semi-solid mixtures of coal and oil. The material is placed in trays 26



325,324

in retorts 14, and is heated by metal rods or bars 20 which extend through the retorts and through heating chambers 12. The trays are supported by the rods, which are heated by conduction from the heated parts in the chambers 12. Distillates are drawn off through conduits 28 and combustion products through flues 40. In a modified apparatus, Fig. 5, the material is fed from a hopper 46 and falls over the heated tubes 20 in a chamber 14^1. The residue falls on to a conveyor 58.

325,364. CALCIUM NITRATE. C. C. Smith, Norton Hall, The Green, Norton-on-Tees, Durham, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, January 25, 1929.

Nitric acid is added to a strong solution of calcium nitrate, and the crystals precipitated are centrifuged and washed by a suspension of chalk in calcium nitrate solution so that the acid is just neutralised. The process may be carried out as above, or oxides of nitrogen may be passed into a solution to which chalk is added continuously. The oxides of nitrogen may be obtained by oxidation of ammonia.

325,387. DYE INTERMEDIATES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, February 12, 1929.

A 2-aminonaphthalene mono- or di-sulphonic acid is acylated and the product treated with a halogenating agent in an acidic medium and the acyl group split off. Examples are given of the treatment of 2-aminonaphthalene-6-sulphonic acid to obtain 1-chloro-2-aminonaphthalene-6-sulphonic acid, 2-aminonaphthalene-8-sulphonic acid to obtain 1-chloro-2-aminonaphthalene-8-sulphonic acid, 2-aminonaphthalene-5-sulphonic acid to obtain 1-chloro-2-aminonaphthalene-5-

sulphonic acid, 2-aminonaphthalene-7-sulphonic acid to obtain 1-bromo-2-aminonaphthalene-7-sulphonic acid.

325,388. MORDANTS. G. B. Ellis, London. From Chemical Works, formerly Sandoz, Basle, Switzerland. Application date, February 13, 1929.

Phenol or a homologue or substitution product, other than a phenol containing nitrogen, is boiled with an aqueous suspension of sulphur and calcium hydroxide, using more than two molecular proportions of sulphur for each molecular proportion of phenol. The precipitated calcium salts are converted into alkali salts. Examples are given.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: —300,130 (I.G. Farbenindustrie Akt.-Ges.), relating to compounds having hydrogenated ring systems, see Vol. XX, p. 53; 302,173 (I.G. Farbenindustrie Akt.-Ges.) relating to azo dyestuffs, see Vol. XX, p. 159; 302,733 (I.G. Farbenindustrie Akt.-Ges.), relating to synthetic rubber, see Vol. XX, p. 189; 304,654 (Compagnie Internationale pour la Fabrication des Essences et Pétroles), relating to catalysts, see Vol. XX, p. 320; 304,697 (Chemische Industrie Akt.-Ges. and H. Mayer) relating to dried superphosphate, see Vol. XX, p. 320; 305,140 (I.G. Farbenindustrie Akt.-Ges.) relating to arylcarbonoxyamido-orthothioglycollic acids, see Vol. XX, p. 340; 306,949 (Trent Process Corporation), relating to production of metals from oxide ores, see Vol. XX, p. 47 (Metallurgical Section); 308,717 (F. Uhde), relating to a material containing a high percentage of calcium nitrate and capable of being readily strewn, see Vol. XX, p. 546; 316,126 (F. Fischer and H. Pichler), relating to production of higher hydrocarbons, see Vol. XXI, p. 294.

Specifications Accepted with Date of Application

303,366. Alkali hydroxides, Manufacture of. I.G. Farbenin dustrie Akt.-Ges. December 31, 1927.

304,589. Colloidal monosodium tetraiodophenolthalein. National Aniline and Chemical Co., Inc. January 21, 1928.

306,093 Distillation of tar. Barrett Co. February 15, 1928.

306,132. Chlorinated organic acid esters of cellulose, Manufacture of. I.G. Farbenindustrie Akt.-Ges. February 17, 1928

310,837. Cementing and hardening iron, iron alloys, and steel Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. May 1, 1928. Addition to 304,209 and 308,963.

311,689. Hydrocarbons, Treatment of. Tar and Petroleum Process Co. May 14, 1928.

316,282. Condensation products from acetylene, Manufacture of. I.G. Farbenindustrie Akt.-Ges. July 27, 1928.

327,094. Products resembling linoxyn or rubber oil substitute, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt-Ges.*). September 17, 1928.

327,106. Improving lead, Process for. O. Y. Imray (*I.G. Farbenindustrie Akt.-Ges.*). December 18, 1928. Addition to 37,397/28.

327,128. Derivatives of the anthracene series, Manufacture of. J. Y. Johnson (*I.G. Farbenindusrtie Akt.-Ges.*). September 26, 1928.

327,130. 4[1]-sulpho-ortho-benzoyl benzoic acid derivatives, and anthraquinone compounds derivable therefrom. I. Gubelmann, H. J. Weiland, and O. Stallmann. September 24, 1928.

327,141. Vat dyestuffs containing nitrogen, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). December 27, 1928.

327,157. Cellulose ethers. H. Dreyfus. December 28, 1928.

327,158. Phenolformaldehyde condensation products, Manufacture of. A. Carpmael (*I.G. Farbenindustrie Akt.-Ges.*). December 28, 1928.

327,162. Products resembling wax, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). September 24, 1928.

327,165. Esterifying polyvalent alcohols or their derivatives. O. Y. Imray (*I.G. Farbenindustrie Akt.-Ges.*). November 22, 1928.

327,175. Halogenated allo-ms-naphtho-dianthrones and condensation products thereof. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). December 27, 1928. Addition to 303,184.

327,193. Sugars and polyhydric alcohols, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). December 3, 1928.

327,194 Destructive hydrogenation of carbonaceous materials, expecially for the production of motor fuels. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). December 3, 1928.

327,224. Isopropyl alcohol, Production of. G. F. Horsley and Imperial Chemical Industries, Ltd. January 25, 1929.

327,374. Carbon black, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). December 19, 1928.

Cracking of Petroleum Oil

Institute of Fuel Paper

A PAPER on "Cracking of Petroleum Oils and Low Temperature Coal Tars," by W. H. Jones, B.Sc., M.Inst.P.T., was read before a meeting of the Institute of Fuel, in the Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, on Wednesday, April 9.

The distillation of crude petroleum to meet the rapidly increasing petrol demand resulted in the production of proportionately large quantities of kerosene, gas oil and fuel oil, for which there was only a very limited demand. It was well known in the industry that by subjecting such residual oils to heat and pressure, decomposition of the hydrocarbons of which they are composed would occur and result in the production of other hydrocarbons resembling the original crude and including low boiling fractions similar in composition to natural or "straight-run" petrol. This reaction under heat and pressure is known as "cracking."

Cracking Processes

The practical applications of this method in oil refining offered many difficulties from an engineering standpoint, and, further, crude oil was so plentiful and cheap that the production of petrol by the cracking method did not show competitive results against the production of petrol by the ordinary distillation of crude petroleum, and it was not until after the war that marked developments occurred. To-day, about one-third of the world's petrol production is produced by the cracking method.

Cracking processes may be divided into two main groups, namely, Vapour-Phase processes, and Liquid Phase processes, both of which were referred to in the paper, and three of the more prominent plants were described. Useful data concerning the results of residual oil cracking of typical oils, products derived from cracking, etc., were given in the form of tables. Cracked petrols have a much higher aromatic content than "straight-run" petrols from the same crude oil and in consequence are considered superior in quality and often command higher prices. All cracked petrols can be commercially treated to meet any desired market specifications with sulphuric acid, caustic soda, sodium plumbite and water, followed by fire and steam distillation.

Furnace or Diesel oil is obtained by the distillation of the pressure distillate or crude petrol produced in the cracking process, and is an oil of narrow boiling range, which may be sold as fuel in domestic furnaces or for Diesel oil engines. It may also be recracked to give additional yields of petrol.

Low Temperature Coal Tars

The latter part of the paper dealt with low temperature coal tars, including all primary tars from the distillation of coal when the temperature of distillation is limited to the extent that substantial decomposition or cracking of the liquid products does not occur in the distillation process. Experiments on the production of petrol from primary tars carried out at the Research Station of the Universal Oil Products Co., Chicago, were referred to and statistics given.

It was stated by the author that, so far as is known, the cracking of low temperature coal tars has never been carried out on a commercial basis, but a cracking unit of 300 barrels a day capacity has been erected for this purpose for use in connection with a low temperature carbonisation installation in Belgium. This is a new installation and has not been in operation long enough to produce sufficient tar to crack, but it is anticipated that operations on low temperature tar will commence shortly, and the results are being looked forward to with considerable interest as proof of the feasibility of commercially cracking primary coal tars into high grade motor fuel, as a practical and profitable process.

It is generally agreed that the ultimate commercial success of the treatment of coal by low temperature carbonisation, depends mainly upon the development of processes suitable for converting the tar into other products which will have an increased commodity value and which will sell at a higher price in the open market than the tar from which they are made.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID, CHROMIC.—1s. 0⅝d. per lb. d/d U.K.

ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—Spot £20 to £25 per ton, makers' works according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.

AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER, 35%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.

CALCIUM CHLORIDE (SOLID).—Spot, £4 15s. to £5 5s. per ton d/d in drums.

CHROMIUM OXIDE.—9½d. and 10½d. per lb. according to quantity d/d U.K.

CHROMETAN.—Crystals, 3⅜d. per lb. Liquor, £18 15s. per ton d/d U.K.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4⅝d. per lb. nett d/d U.K. spot; ground ½d. per lb. extra.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—8½d. per lb. d/d U.K.

SALAMMONIAC.—Firsts lump, spot, £42 10s. per ton d/d station in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE, UNGROUND.—Spot, £3 7s. 6d. per ton d/d station in bulk.

SODA ASH, 58° E.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

SODA CAUSTIC, SOLID, 76/77%.—Spot, £14 10s. per ton, d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2 cwt. bags.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.

SODIUM BICHROMATE CRYSTALS.—3⅝d. per lb. nett d/d U.K. spot. Anhydrous ¾d. per lb. extra.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM CHROMATE.—3¾d. per lb. d/d U.K.

SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.

SODIUM SULPHIDE CONC. SOLID.—Spot, £10 5s. per ton d/d in drums. Crystals—Spot, £7 10s. per ton d/d in sellers' casks.

SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs Commercial—Spot, £9 per ton, d/d station.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—7d. to 7½d. per lb. Crude 60's, 2s. 5d. April-June, 2s. 4d. July-Dec. per gall.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 6d. per gall. Pure, 5s. 6d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. to 2s. 2d. Dark, 1s. 6d. to 1s. 10d. Refined, 2s. 7d. to 2s. 10d. per gall.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4¾d. to 5¼d. per gall. 1100, 5¼d. to 6d. per gall.; 1110, 6d. to 6½d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 5d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, for Export, 6¼d. to 6⅜d. per gall. Home, 4d. per gall. d/d. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 1¼d. to 1⅜d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8¼d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 6d. per gall. Solvent 90/190, 1s. to 1s. 2½d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £4 10s. per ton. Hot pressed, £8 per ton.

NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 46s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—3s. 9d. per lb. 100% d/d buyer's works.

ACID H.—2s. 3d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 6d. per lb. 100% d/d buyer's works.

ACID NEVILLE AND WINTHER.—2s. 7d. per lb. 100% d/d buyer's works.

ACID SULPHANILIC.—8½d. per lb. 100% d/d buyer's works.

ANILINE OIL.—8½d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—8½d. per lb. d/d buyer's works.

BENZALDEHYDE.—1s. 8d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—2s. 4d. per lb. 100% d/d buyer's works.

BENZOIC ACID.—1s. 8½d. per lb. d/d buyer's works.

o-CRESOL 29/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots d/d.

p-CRESOL 32/34° C.—2s. per lb., in ton lots d/d.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 9½d. per lb., drums extra d/d buyer's works.

DINITROBENZENE.—8d. per lb.

DINITROCHLORBENZENE.—£74 per ton d/d.

DINITROTOLUENE.—48/50° C., 7½d. per lb.; 66/68° C., 9d. per lb.

DIPHENYLAMINE.—1s. 8d. per lb. d/d buyer's works.

a-NAPHTHOL.—1s. 11d. per lb. d/d buyer's works.

B-NAPHTHOL.—£65 per ton in 1 ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—1s. per lb. d/d buyer's works.

B-NAPHTHYLAMINE.—2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 11d. per lb.

m-NITRANILINE.—2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—6½d. per lb, 5-cwt. lots, drums extra, d/d buyer's works.

NITRONAPHTHALENE.—9d. per lb.

R. SALT.—2s. per lb. 100% d/d buyer's works.

SODIUM NAPHTHIONATE.—1s. 6½d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—8d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—1s. 9d. per lb. d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 1d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.

WOOD CREOSOTE.—1s. 9d. per gall., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 8d. to 1s. 10d. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity.

CARBON BLACK.—4 1/16d. to 4½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 6d. per lb.

LITHOPONE, 30%.—£20 to £22 per ton.

SULPHUR.—£9 10s. to £13 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£55 to £60 per ton.

ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton, ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity

ACID, BENZOIC B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 4d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, £32 per ton; powder, £36 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 8½d. per lb., less 5%.

ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 3d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE.—5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb spot.

BISMUTH CARBONATE.—7s. 6d. per lb.

BISMUTH CITRATE.—7s. 6d. per lb.

BISMUTH SALICYLATE.—7s. 3d. per lb.

BISMUTH SUBNITRATE.—6s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. per lb.

BISMUTH OXIDE.—9s. 6d. per lb.

BISMUTH SUBCHLORIDE.—9s. 9d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 11½d. per lb.; 12 W. Qts. 10d. per lb.; 36 W. Qts. 9d. per lb.

BORAX B.P.—Crystal, £21 per ton; powder, £22 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.

BROMIDES.—Ammonium, 2s. 0d. per lb.; potassium, 1s. 8d. per lb.; granular, 1s. 5½d. to 1s. 7¾d. per lb.; sodium, 1s. 11d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 1½d. to 1s. 3d. per lb., in 1-cwt. lots.

CAMPHOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity; other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 9d. per lb. Green, 2s. 10d. to 3s. per lb. U.S.P., 2s. 7d. to 2s. 10d. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 15s. 9d. per lb. net; Synthetic, 9s. 6d. to 11s. 9d. per lb.; Synthetic detached crystals, 9s. 6d. to 11s. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 8½d. to 4s. 1d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—98s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 6d. per lb. in 28 lb. lots. Smaller quantities 1d. per lb. more.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.

SODIUM CITRATE, B.P.C., 1911, AND U.S.P. VIII.—2s. 2d. per lb., B.P.C. 1923, and U.S.P. IX—2s. 6d. per lb. Prices for 28 lb. lots. Smaller quantities 1d. per lb. more.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHIDE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 1s. 10d. per lb.

THYMOL.—Puriss, 7s. 6d. to 8s. 6d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—12s. per lb.

AMYL SALICYLATE.—3s. per lb.

ANETHOL (M.P. 21/22° C.).—6s. 6d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.

BENZYL BENZOATE.—2s. 6d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—12s. per lb.

CITRONELLOL.—10s. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—9s. 6d. per lb.

GERANIOL (PALMAROSA).—20s. per lb.

GERANIOL.—7s. 6d. to 10s. per lb.

HELIOTROPINE.—6s. 6d. per lb.

ISO EUGENOL.—11s. 9d. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—44s. per lb.

SAFROL.—2s. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—13s. 6d. to 15s. per lb. Ex Guaiacol, 12s. 6d. to 13s. 9d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—4s. 3d. per lb.

BERGAMOT OIL.—11s. 3d per lb.

BOURBON GERANIUM OIL.—18s. per lb.

CAMPHOR OIL, WHITE.—16os. per lb.

CANANGA.—Java, 9s. 6d. per lb.

CASSIA OIL, 80/85%.—4s. 9d. per lb.

CINNAMON OIL LEAF.—7s. 9d. per oz.

CITRONELLA OIL.—Java, 2s. 8d. per lb., c.i.f. U.K. port; pure, Ceylon, 2s. 8d. per lb.

CLOVE OIL (90/92%).—7s. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 9d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 11s. 6d. per lb.

LEMON OIL.—5s. 3d. per lb.

LEMONGRASS OIL.—4s. per lb.

ORANGE, SWEET.—11s. 3d. per lb.

PEPPERMINT.—Wayne County, 14s. per lb.; Japanese, 5s. 9d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 15, 1930.

THERE has been rather a lessened volume of inquiry during the past few days, and it is a tribute to the healthy state of the markets that prices are not to any extent quoted lower. Export business has been a little better.

General Chemicals

ACETONE.—Continues to be in regular request with prices firmly maintained at £71 10s. to £80 per ton according to quantity.

ACETIC ACID.—In quite good request up to recently, and price is unchanged at £36 10s. for 80% and £37 10s. for 80% edible.

ACID CITRIC.—Still in slow demand but price has shown no further weakening and is now steady at about 1s. 9d. per lb., less 5%.

ACID LACTIC.—In steady request with price firm at £43 per ton for 50%, by weight, pale quality.

ACID OXALIC.—Steady at £30 7s. 6d. to £32 per ton, according to quantity.

ALUMINA SULPHATE.—Unchanged and in fair demand at £8 to £8 15s. per ton for the 17/18% iron-free quality.

ARSENIC.—Demand is still very slow, and price continues easy at about £15 15s. per ton, free on rails at mines.

BORAX.—Prices are firmly maintained and there is a regular business passing.

CREAM OF TARTAR.—Demand is still on the quiet side and prices are unchanged at 98s. 6d. per cwt.

COPPER SULPHATE.—Inquiry is broadening and price is steady at about £26 10s. per ton at London.

FORMALDEHYDE.—In regular request at £34 10s. per ton.

LEAD ACETATE.—Quoted slightly lower at about £41 5s. for white, and £40 5s. for brown, with demand rather slow.

LEAD NITRATE.—In quiet request at £33 per ton.

LIME ACETATE.—Unchanged and demand is only for small quantities.

LITHOPONE.—The market continues steady at £19 15s. to £23 per ton, according to grade and quantity.

POTASSIUM CARBONATE.—In quiet request at about £27 per ton for 96/98% quality.

PERMANGANATE OF POTASH.—Slightly firmer conditions are noticeable and the demand is fairly satisfactory. Present price is firm at 5½d. per lb.

SODIUM BICHROMATE.—Firm at 3⅝d. and in steady demand.

SODIUM HYPOSULPHITE.—Photographic crystals are in better request at £14 15s. per ton and Commercial quality quoted firm at £8 10s. to £9 per ton.

SODIUM SULPHIDE.—In slow demand, but price is firm at British makers' prices.

TARTAR EMETIC.—Only in occasional request at about 11d. per lb.

ZINC SULPHATE.—Steady at £13 per ton.

Coal Tar Products

There is still no change to report in the prices of coal tar products, and the market remains uninteresting.

MOTOR BENZOL.—Unchanged, at about 1s. 5½d. to 1s. 6d. per gallon f.o.r.

SOLVENT NAPHTHA.—Quoted at about 1s. 2½d. to 1s. 3d. per gallon f.o.r.

HEAVY NAPHTHA.—Remains at about 1s. 1d. per gallon f.o.r.

CREOSOTE OIL.—Unchanged, at 3d. to 3½d. per gallon f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at 2s. per gallon for the 98/100% quality, and at 1s. 10d. per gallon ex works for the dark quality 95/97%.

NAPHTHALENES.—The firelighter quality is quoted at £3 10s. to £3 15s. per ton, the 74/76 quality at £4 to £4 5s. per ton, and the 76/78 quality at about £5 per ton.

PITCH.—Quoted at a nominal figure of 45s. to 47s. 6d. per ton, f.o.b. East Coast port.

The following additional prices have been received :—

CARBOLIC ACID.—No change.

ACETYL SALICYLIC ACID B.P.—Prices are unchanged at 2s. 9d. to 2s. 11d. per lb.

METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.

CRESYLIC ACID.—Business has been steady, with prices unchanged at those reported last week.

SODIUM SALICYLATE, B.P.—Crystals 1s. 11d. to 2s. 3d. per lb. Powder 1s. 10d. to 2s. 2d. per lb.

SACCHARIN.—The Budget makes no alteration in the sugar duties, so that prices are unchanged at 43s. 6d. per lb., duty paid, with usual rebates.

Nitrogen Fertilisers Market

Sulphate of Ammonia.—Export.—The market for sulphate remains unchanged at £8 per ton f.o.b. U.K. port, in single bags. As this is the consuming season for continental countries, the quantities offered for shipment are comparatively small. Agricultural depression tends to retard growth of consumption except in Russia, to which country large sales both of nitrate of soda and sulphate of ammonia are reported. *Home.*—Agricultural merchants still remain pessimistic, and now that the season is well advanced it appears certain that there will be a decline in consumption in the United Kingdom for the present season. Prices remain unchanged.

Nitrate of Soda.—In most markets deliveries to consumers show a satisfactory increase during the months of February and March. Prices are firmly maintained at the scales fixed by the Producers' Association.

Latest Oil Prices

LONDON, April 15.—LINSEED OIL was quiet. Spot, ex mill, £40 ; April, £38 15s. ; May-August, £38 2s. 6d. ; and September-December, £37 5s., naked. RAPE OIL was steady. Crude, extracted, £39 ; technical, refined, £40 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £29 ; refined common edible, £34 ; and deodorised, £36, naked, ex mill. TURPENTINE was quiet. American, spot, to June, 44s. 6d. ; Russian, spot, 41s. per cwt.

HULL.—LINSEED OIL. Spot, £40 10s. ; April, £40 ; May-August-£39 ; September-December, £38 5s. per ton, naked. COTTON OIL.—Egyptian, crude, spot, £29 5s. ; edible, refined, spot, £32 10s. ; technical, spot, £34 10s. per ton, naked. PALM KERNEL OIL.—Crude, 5½ per cent., spot, £32 per ton, naked. GROUNDNUT OIL.—Crushed extracted, spot, £33 10s. ; deodorized, spot, £37 10s. per ton. SOYA OIL.—Extracted and crushed, spot, £30 10s. ; deodorized, spot, £34 per ton. RAPE OIL.—Crushed extracted, spot, £36 10s. ; refined, spot, £38 10s. per ton. TURPENTINE, CASTOR OIL, and COD OIL unaltered.

South Wales By-Products

SOUTH WALES by-product activities remain unchanged. Business in most products is quiet and it is unlikely that there will be any improvement until after the holiday week. Patent fuel manufacturers are buying very little pitch and supplies are now well in excess of demand. Other pitch buyers are buying only small quantities. Pitch values are unchanged. Road tar has a steady, but moderate, call at from 10s. to 12s. per 40-gallon barrel. Refined tars are unchanged, the demand for coke-oven and gasworks tar being moderate, with values unchanged. Solvent naphtha has a fair market at from 1s. 3d. to 1s. 5d. per gallon, but heavy is slow at from 11d. to 1s. 1d. per gallon. Creosote continues to be slow at from 2½d. to 3½d. per gallon. Sulphate of ammonia has a fair call at £10 2s. per ton delivered. Patent fuel and coke exports remain moderate. Export quotations for patent fuel are :—22s. to 22s. 6d. ex-ship Cardiff ; 21s. ex-ship Newport, and 20s. to 21s. ex-ship Swansea. Coke quotations for all grades are unchanged at all South Wales ports.

Scottish Coal Tar Products

THERE is very little change to report in values this week. Orders have been scarce, and the possibility of the Budget affecting motor spirit has had the effect of holding up supplies of water white products. Fair supplies should now be offered at not more than previous levels.

Cresylic Acid.—Quotations remain firm although orders are less frequent. Pale 99/100%, 1s. 11d. to 2s. per gallon ; pale 97/99%, 1s. 10d. to 1s. 11d. per gallon ; dark 97/99%, 1s. 8¾d. to 1s. 9¾d. per gallon ; all f.o.r. makers' works. High boiling acid is about 1s. 9½d. to 1s. 11½d. per gallon.

Carbolic Sixties are scarce in this area and value is nominal at 2s. 4d. to 2s. 5d. per gallon for ordinary grades.

Creosote Oil.—No change can be reported and the position is far from satisfactory. Specification oil, 3d. to 3½d. per gallon ; gas works ordinary, 2⅞d. to 3⅜d. per gallon ; washed oil, 3d. to 3½d. per gallon ; all ex works.

Coal Tar Pitch is nominal at 47s. 6d. per ton f.a.s. Glasgow for export. Home values is easy at 50s. to 52s. 6d. per ton f.o.r. works.

Blast Furnace Pitch.—The controlled prices are unchanged at 30s. per ton f.o.r. works for home trade and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—There is still no great demand for prompt delivery, but quotations are held at 3⅞d. to 4⅜d. per gallon f.o.r. works in buyers' packages.

Blast Furnace Tar is 2⅜d. per gallon f.o.r. works.

Crude Naphtha.—Production is gradually increasing and value is easier at about 4d. to 5d. per gallon ex works.

Water White Products.—Distillers have been refusing to offer during the week, but quotations should now be easy. 90/160 naphtha is 1s. 2d. to 1s. 2½d. ; 90/190, 1s. to 1s. 0½d. ; and motor benzole, 1s. 6d. to 1s. 6½d. ; all per gallon f.o.r. makers' works, in bulk.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, April 16, 1930.

As expected, business has been quiet for some little time, for reasons which most of our readers will appreciate. In view of what has transpired during the past week we think that activity will become more marked. Prices have remained practically unchanged.

Industrial Chemicals

ACETONE, B.G.S.—£71 10s. to £80 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply, but prices remain unchanged as follows:—98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports. 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton; powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Quoted 8d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. per lb., less 5% ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy; dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at same price—viz., 3¼d. per lb., ex store. Offered from the Continent at 3⅛d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 114° quality, £5 15s. per ton for 168°. Dearsenicated quality 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 4d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA, ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton, powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture, quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Rather easier, and spot material now obtainable at round about £34 per ton, ex wharf. On offer for prompt shipment from China at about £30 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Quoted £18 per ton, ex wharf, prompt dispatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports. For Continental material our price would be £10 per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. per ton to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £35 per ton, ex store. Continental material now on offer at about £34 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 10s. per ton, delivered buyer's works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. in moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4⅜d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton, ex store. Offered from the Continent at £25 5s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100%.—Powder quoted £25 10s. per ton, ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted at 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb., ex wharf.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅝d. per lb., delivered buyers' premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 13s. per ton, ex quay, minimum 4-ton lots, with various reductions for contracts.

SODIUM CAUSTIC.—Powdered, 98/99%, £17 10s. per ton, in drums, £18 15s. per ton in casks. Solid, 76/77%, £14 10s. per ton in drums; £14 12s. 6d. per ton for 70/72% in drums, all carriage paid buyers' stations, minimum 4-ton lots. For contracts 10s. per ton less.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £10 2s. per ton, carriage paid buyers' sidings, miminum 5-ton lots, but demand in meantime is small.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offez at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 55s. per ton, ex works; 57s. 6d. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid, 60/62%, £9 15s. Broken, 60/62%, £10 15s. per ton. Crystals, 30/32%, £7 17s. 6d. per ton, all delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE, 98%.—British material offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

The "Singaldrop" Acid Tester

MR. A. E. BAWTREE, the inventor, sends us a sample outfit of his "Singaldrop" Acid Tester, which is intended to give the approximate strength of any mineral acid solution almost instantly and by the use of a single drop. It consists of books of sensitised papers, a holder with circular opening, and a standard colour chart, and it all fits into a case for the pocket. Most kinds of manufacture involve the use of mineral acids alone or mixed with other materials and, while the submission of every bath to frequent chemical analysis might be ideal, such a plan is expensive and involves delays. It frequently happens, therefore, that baths are run until they begin to work badly, for want of a quick and simple method of ascertaining their tendency. The "Singaldrop" Acid Tester is as simple to operate as a piece of Litmus paper; it indicates the strength of acid present in a solution by the aid of a single drop. In practice, a works manager or foreman might very soon memorise the part of the colour chart which interested him and make his test by taking a scrap of the test paper from his pocket and touching it with a drop of acid.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, April 16, 1930.

Dull conditions have obtained in the chemical market here during the greater part of the past week, the quietness due to the unsatisfactory demand for textile chemicals having been accentuated, if anything, by the usual influence of the approach of Easter. Now that Budget uncertainties are a thing of the past, the hold-up, if any, from that cause, should now disappear and the way be opened for some improvement in the volume of business when the market settles down again after Easter. With regard to chemical prices, steadiness is still a feature of most sections.

Heavy Chemicals

Bicarbonate of soda is the subject of a quietly steady trade, and offers of this material are on a firm contract basis of £10 10s. per ton. Phosphate is moving only in limited quantities at the moment, with quotations for the dibasic quality at about £11 5s. per ton. Glauber salts are still obtainable at round £2 15s. per ton, but not much weight of business is going through. There is a moderate call for sulphide of sodium, values of which keep up; the commercial quality is quoted at up to £8 per ton and the 60–65 per cent. concentrated solid at about £9 15s. Saltcake is attracting fair attention and prices are steady in the neighbourhood of £3 per ton. A fair volume of inquiry is in evidence in the case of alkali, contract quotations for which are at round £6 per ton. The demand for caustic soda is about maintained at its recent level and prices are firm on the basis of £12 15s. to £14 per ton, in contracts and according to quality. Bichromate of soda is attracting some attention and values are steady at 3⅜d. per lb., less 1 to 2½ per cent. Only a relatively slow business is reported in the case of hyposulphite of soda, current sales of which are at about £9 per ton for the commercial grade and up to £15 10s. for the photographic. There is room for improvement in the demand for chlorate of soda, although prices in this section are steady at from about £25 to £27 per ton, ex store and according to quality.

Among the potash materials, permanganate is rather slow of sale, but offers of this are unchanged on the week at round 5¼d. per lb. for the commercial grade and 5½d. for the B.P. Yellow prussiate of potash is moderately active, and values are well held at from 6¾d. to 7¼d. per lb., according to quantity. Bichromate of potash is steady and meets with a fair volume of inquiry at 4⅜d. per lb., less 1 to 2½ per cent. Chlorate of potash continues to be offered at from £26 to £28 per ton, according to quantity, but buying interest in this material during the past week has been on rather narrow lines. There is a moderate demand about in the case of caustic potash at round £31 per ton, and also for carbonate of potash, which is quoted at from £26 to £26 10s. per ton.

There is only a moderate response to the relatively low rate of £26 per ton, f.o.b., at which sulphate of copper is now being quoted. Arsenic is reasonably steady at from £15 15s. to £16 per ton at the mines, for white powdered, Cornish makes, but the demand is quiet. Buying interest in the lead compounds shows little sign of improvement, but prices are maintained at round £37 and £38 per ton for brown and white acetate, and about £31 10s. per ton for nitrate. There has been little or no change in the position of the acetates of lime, a quiet business in which is going through on the basis of £7 5s. per ton for the brown material and £15 10s. for the grey.

Acids and Tar Products

Acetic acid is attracting a fair amount of attention and values are firm at round £66 per ton for the glacial quality and £36 for the commercial 80 per cent. strength. Oxalic acid is steady at £1 12s. 6d. per cwt., ex store, but the demand for this has been rather subdued during the past week. Citric acid shows no further change and a quiet business is being done at about 1s. 8¾d. per lb. Tartaric acid is on offer this week at from 1s. 3d. to 1s. 3¼d. per lb., with sales of moderate extent.

Pitch is a quiet section of the by-products market, though prices are nominally steady at 47s. 6d. per ton, f.o.b. Creosote oil is in relatively slow demand at 3¾d. to 4¼d. per gallon, naked. Carbolic acid crystals are steady and in moderate request, with crude 60's material obtainable at about 2s. 6d. per gallon, naked. Solvent naphtha is quoted this week at round 1s. 2½d. per gallon, naked.

Company News

Babcock and Wilcox.—The directors recommend a final dividend on the ordinary shares for 1929 of 8 per cent., making a total of 15 per cent., tax free, for the year.

Bryant and May.—A final dividend for the year ended March 31, 1930, is recommended on 1,320,000 ordinary shares at the rate of 4 per cent., free of income tax, and 5 per cent., on the partnership shares.

English China Clays, Ltd.—The net profits for the year to December 31 last (after making all usual provisions for depreciation of plant, machinery, leases, etc.), amount to £129,621, as compared with £71,923 for the preceding year. Adding the brought forward of £17,062, there is available £146,683. The directors recommend a final dividend of 2½ per cent. on ordinary shares, making 4 per cent. for the year, against 3 per cent. for 1928, placing to general reserve £40,000, against nil, carrying forward £19,110.

Eastman Kodak Co.—The Eastman Kodak Co. and its subsidiaries in 1929 are stated to have exceeded all their previous earnings' records, with a net profit of $22,004,915·59. Preferred dividends paid during 1928 amounted to $369,492. Common dividends totalled $16,630,512. The sum left to be added to the surplus was $4,786,861·59, after the deduction of a reserve fund of $227,600 for dividends on stock in litigation and after adjustments in respect to income taxes of prior years and employés' retirement annuities. The total surplus thus became $82,780,537·33 on December 28, 1929.

Tariff Changes

British India.—Calcium acetate has been exempted from duty on import into British India.

Italy.—A Royal Decree-Law, effective as from March 27, authorises, as a temporary measure, the duty-free admission, under conditions to be laid down by the Minister of Finance, of resorcin to be used in the printing of textiles (*tessuti*).

Serb-Croat-Slovene Kingdom.—The import duty on sulphate of copper has been temporarily reduced from 12 to 9 gold dinars per 100 kilogrammes during the period March 28 to June 30, 1930.

Spain.—A Royal Order, dated March 18, provides that blocks of asbestos and magnesia are to be classed under Tariff No. 26, the "Second Column" duty (applicable to imports of United Kingdom origin), being 3 pesetas (gold) per 100 kilogs.

Netherlands.—As a result of the recent law abolishing the 20 per cent. surcharge on the sugar excise the specific Customs duties on certain goods containing sugar have been reduced. The additional duty on ethyl alcohol and products and substances containing at 15 deg. C. more than 5 litres of ethyl alcohol to the hecto-litre, is reduced to the following rates:—(*a*) If containing saccharine or other artificial sweetening matter, 22·50 florins per hectolitre; (*b*) if containing more than 5 per cent. of sugar (except if covered by subdivision (*a*): More than 5 per cent. but not more than 10 per cent., 2·25; more than 10 per cent. but not more than 25 per cent., 5·65; more than 25 per cent. but not more than 50 per cent., 11·25; more than 50 per cent. but not more than 75 per cent., 16·90; more than 75 per cent., 22·50. The duty on calcium saccharate, iron saccharate, strontium saccharate and similar compounds of sugar from which sugar can be regained is now (*a*) Packed or in tablet form, 8 per cent. *ad valorem* and 22·50 fl. per 100 kilogs; (*b*) Imported in any other form, 22·50 fl. per 100 kilogs.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Norway.—An agent in Oslo desires to obtain the representation of British manufacturers of chemicals for the paper industry. Ref. No. 304.

Austria.—A firm in Vienna wishes to represent British manufacturers of chemicals for technical and pharmaceutical purposes, drugs and petroleum jelly. Ref. No. 296.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to May 2, 1930.

CHROMILITE.

507,472. Class 1. Chemical substances used in chromium plating. The Metals Protection Corporation (a Corporation organised under the laws of the State of Indiana), 401, West Michigan Street, Indianapolis, County of Marion, State of Indiana, United States of America; manufacturers. November 4, 1929. To be associated with No. 507,473 (2,714), viii and another.

SULSOL.

509,305. Class 1. Colloidal sulphur, being a chemical substance for use in manufactures. Einstein's Electro Chemical Process, Ltd., Cockpit House, 38, Old Queen Street, Westminster, London, S.W.1; manufacturers. January 7, 1930.

ZISCALE.

510,365. Class 1. Boiler fluid for the prevention and removal of scale in steam boilers and the like. Reginald Hugh Pearce, trading as R. Edison and Co., Bath Hill, Keynsham, Somerset; chemical manufacturer. February 14, 1930.

SOLV-O-HOL.

510,811. Class 1. Chemical substances used as solvents in the manufacture of flavourings and perfumery. Felton Chemical Co., Inc. (a Corporation organised under the laws of the State of New York), 599, Johnson Avenue, Brooklyn, New York, United States of America; manufacturers. February 28, 1930.

PROMINAL.

510,993. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Ltd., 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. March 8, 1930.

REPHRIN.

510,994. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Ltd., 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. March 8, 1930.

Tarmac, Limited

Effect of Last Year's Frost

MR. C. E. HICKMAN presiding at the annual meeting of Tarmac, Ltd., at Birmingham, stated that the almost unprecedented frost early last year which brought roadmaking to a standstill accounted for a loss of 13 per cent. of the output for the year. The Vinculum side of the business had been going ahead, but, like every other good thing, immediately they started to do well they got competition. In the case of Vinculum this competition had arisen, but he was glad to say they were able to hold their own. The question was often raised as to why an effort was not made to avoid price-cutting by forming an association. He was glad to be able to tell the shareholders that most of the makers had now agreed to endeavour to check the ruinous competition that had so seriously affected the industry during recent years.

Mr. Cecil Martin (managing director), in seconding the resolution, spoke of the activities of the company and the prospects for the future. He said "Tarmac," the company's registered name for tarred road stone manufactured from specially treated blast-furnace slag, continued to enjoy a widespread popularity amongst county and municipal authorities responsible for road maintenance and construction throughout England and Wales. Their material had stood the gruelling test of over twenty-five years' service, and, as the pioneers of this form of road construction, they could justly claim that in spite of the keenest competition their product still stood pre-eminent. In 1920 they commenced in a small way the manufacture of concrete articles. To-day the word "Vinculum," which was the registered trade name of their concrete products, was known throughout England, and was the hall-mark of all that was best in artificial stone construction.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

FRANCIS AND CUNNINGHAM, LTD., Bacup, bleachers, etc. (M., 19/4/30.) Registered April 4, mortgage to Bank; charged on Heightburn Mill, Bacup.

RENNES ARTIFICIAL SILK CO., LTD., London, E.C. (M., 19/4/30.) Registered March 31, by order on terms, notarial mortgage and pledge dated June 12, 1929, securing 2,160,000 French francs with premium of 5 per cent. to L'Association Foncière et Immobilière Société Anonyme of Paris; mortgage of land, factory, etc., at Rennes, France, and pledge of Fonds de Commerce, etc. *£17,447. March 7, 1930.

Receiverships

MATTHEWS AND WILSON, LTD. (R., 19/4/30.) C. F. Slater, of 482, Seven Sisters Road, N., was appointed receiver and manager on March 27, 1930, under powers contained in debenture, part of series dated May 16, 1928.

New Companies Registered

QUIKSOKLENE CO., LTD.—Registered April 9. Nominal capital, £500 in £1 shares. Manufacturers of and dealers in polishes for all purposes, oils, paints, colours, pigments, varnishes, chemicals, minerals, drugs, dyes and all other substances, etc. Directors: W. L. Page, 96, Sandford Road, Moseley, Birmingham, and L. V. Cullingford.

The Affairs of Blount and Co.

IN preparation for the annual meeting of Blount and Co., which was held at Derby on Wednesday, a special report was prepared by Mr. Charles J. Pain (of the firm of Hubbart, Durose, and Pain, chartered accountants, of Nottingham) on the affairs of the company and on the formation arrangements. Since the company was incorporated in 1927, numerous changes have taken place on the board. Dr. Stephen Miall (the first chairman, and a director also of Clayton-Murdoch, Ltd., the promoters, and of F. Slyth and Co., Ltd., one of the associated companies taken over) resigned on November 19, 1929; Mr. J. P. J. Peregrine (an original director and also a director of Clayton-Murdoch and F. Slyth and Co.) retired at the first annual meeting; Sir William Pope (a director of Clayton-Murdoch) was appointed on February 26, 1929, and resigned on December 3 the same year; and Mr. F. Blount (an original director) resigned on May 14, 1929. The balance sheet shows a loss for 18 months to December 31, 1929, of £31,277.

New Canadian Chemical Plant

MR. ARTHUR B. PURVIS, president of Canadian Industries, Ltd., in his annual report to the shareholders, stated that while mining developments in the Middle West area had not yet been quite as promising as was hoped, a site had been acquired for the company's proposed new explosives plant, and construction would be started in the spring of this year. The company's new acid plant now being built at Copper Cliff, Ontario, will be producing about the middle of 1930, and will include a unit for the manufacture of a large tonnage of nitre cake, for the delivery of which a long-term contract has been made with the International Nickel Company of Canada, Ltd. A plant for the manufacture of ammonia by the Casale process is being built at Sandwich, Ontario, and the product will be supplied to the company's explosives plant at Beloeil, Quebec, for the manufacture of nitric acid by the ammonia-oxidation method.